



Gladstone Ports Corporation

Growth, Prosperity, Community.

Plan

Gatcombe and Golding Cutting Channel Duplication Project Dredging Environmental Management Plan

Endorsed:

Brief description

This Dredging Environmental Management Plan has been developed to document Gladstone Ports Corporation's systems and controls for minimising the risk of environmental impacts associated with the Gatcombe and Golding Cutting Channel Duplication Project in the Port of Gladstone. Specifically, this plan applies to the dredging operation, including the dewatering process within the existing Western Basin and Western Basin Expansion reclamation areas.

This Dredging Environmental Management Plan forms part of the Environmental Impact Statement prepared for the Gatcombe and Golding Cutting Channel Duplication Project.

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Custodian	Environment Manager

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Abbreviations

The following abbreviations apply to this Plan:

Term	Definition
AASS	actual acid sulfate soil
AEIS	Additional Information to the EIS
ASS	acid sulfate soil
ASSMP	Acid Sulfate Soil Management Plan
BPAR	benthic photosynthetically active radiation
BUF	barge unloading facility
CCRCMP	Curtis Coast Regional Coastal Management Plan
CEnvO	Contractor's Environmental Officer
Coastal Act	<i>Coastal Protection and Management Act 1995 (Qld)</i>
CSD	cutter suction dredger
Cth	Commonwealth
DAWR	Department of Agriculture and Water Resources
DES	Department of Environment and Science
DoEE	Department of Environment and Energy
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
EP Reg	<i>Environmental Protection Regulation 2008 (Qld)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
ERA	Environmentally Relevant Activity
GLNG	Gladstone Liquefied Natural Gas
GPC	Gladstone Ports Corporation Limited
IMO	International Maritime Organisation



Term	Definition
LAT	lowest astronomical tide
LNG	liquefied natural gas
MCU	material change of use
MNES	Matters of National Environmental Significance
MSQ	Maritime Safety Queensland
NAGD	<i>National Assessment Guidelines for Dredging 2009</i>
NEPM 2013	National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment 1, 2013)
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
NTU	nephelometric turbidity unit
OUV	outstanding universal value
PASS	potential acid sulfate soils
Project	Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project
QCLNG	Queensland Curtis Liquefied Natural Gas
QGC	Queensland Gas Corporation
QH Act	<i>Queensland Heritage Act 1992 (Qld)</i>
QPWS	Queensland Parks and Wildlife Counter Service Offices
RHM	Regional Harbour Master
SDPWO Act	<i>State Development and Public Works Organisation Act 1971 (Qld)</i>
TSHD	trailing suction hopper dredger
TSS	total suspended solids
WB	Western Basin
WBE	Western Basin Expansion
WHA	World Heritage Area
WICT	Wiggins Island Coal Terminal



Term	Definition
g/m ²	grams per meter squared
km	kilometres
m	metres
m LAT	meters lowest astronomical tide
mm	millimetres
m/s	meters per second
m ³	cubic metre
m ³ /s	cubic meters per second
mg/L	milligrams per Litre
Mm ³	million cubic metres



1. Background

The Port of Gladstone is located approximately 525 kilometres (km) north of Brisbane and 100km south of Rockhampton on the Capricorn Coast of Central Queensland. The Port is managed by the Gladstone Ports Corporation Limited (GPC) which is a Government Owned Corporation under the *Government Owned Corporations Act 1993* (Qld).

GPC is currently working to improve operational and economical efficiencies within the Port of Gladstone as throughput and associated vessel numbers, including Capesize vessels, increase. The Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project (the Project) involves the duplication of the existing Gatcombe and Golding Cutting bypass shipping channels to provide deeper duplicated channels parallel to the main shipping channels with a sufficient depth to allow an improved two-way passage into the Port under all weather and tidal conditions.

The Coordinator-General declared the Project to be a coordinated project for which an Environmental Impact Statement (EIS) is required under the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act).

The Commonwealth Environment Minister declared the Project to be a controlled action for which an EIS is required under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

This Dredging Environmental Management Plan (Dredging EMP) forms part of the Project EIS (public display version) and Additional Information to the EIS (AEIS). Specifically this plan applies to the dredging operation, including the dewatering process within the existing Western Basin (WB) and proposed Western Basin Expansion (WBE) reclamation areas.

The environmental management of other components of the Project, not associated with the dredging activities, have been included in the Project EMP.



2. Scope

The scope of this Dredging EMP covers the following activities associated with the dredging component of the Project:

- Capital dredging for a barge access channel from the Fisherman's Landing swing basin to the proposed barge unloading facility (BUF) adjacent to the existing WB reclamation area
- Capital dredging to duplication the Gatcombe and Golding Cutting Channel bypass shipping channels

Further details on the Project activities are provided in Section 7.

This Dredging EMP will be read in conjunction with:

- The Project Environmental Monitoring Procedure (refer Appendix A)
- The GPC Environmental Management System (EMS) (refer Section 6)
- Dredging contractors' Dredging EMP (to be developed prior to dredging activities).

The Dredging EMP specifies performance objectives, actions and procedures to minimise and mitigate potential environmental impacts of dredging, transport and dredged material placement and dewatering activities within the WB and WBE reclamation areas, and address the Commonwealth and Queensland Government's EIS approval requirements.

This Dredging EMP complements the findings of the Project EIS as it consolidates the relevant Project activity-specific environmental management and mitigation measures to be implemented during the Project dredging activities.



3. Environmental legislation

This Dredging EMP has been developed to support the Project EIS and respond to the terms of reference for the EIS issued by the Coordinator-General and the EIS Guidelines issued by the Commonwealth Government.

The following Commonwealth legislation is relevant to the Project dredging and dredged material placement activities:

Biosecurity Act 2015

- EPBC Act
- *Great Barrier Reef Marine Park Act 1975* (Cth) and regulations
- *National Greenhouse and Energy Reporting Act 2007* (Cth) (NGER Act)
- *Native Title Act 1993* (Cth)
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*.

The following State legislation is relevant to the Project dredging and dredged material placement activities:

- *Aboriginal Cultural Heritage Act 2003* (Qld)
- *Biosecurity Act 2014* (Qld)
- *Coastal Protection and Management Act 1995* (Qld)
- *Environmental Offsets Act 2014* (Qld)
- *Environmental Protection Act 1994* (EP Act), environmental protection policies and regulation (Qld)
- *Fisheries Act 1994 and regulation* (Qld)
- *Land Act 1994* (Qld)
- *Maritime Safety Queensland Act 2002* (Qld) and *Queensland Coastal Contingency Action Plan 2017*
- *Nature Conservation Act 1992* (Qld) (NC Act) and regulations
- *Planning Act 2016* (Qld) and regulation
- *Queensland Heritage Act 1992* (Qld)
- SDPWO Act
- *Sustainable Ports Development Act 2015* (Qld)
- *Transport Infrastructure Act 1994* (Qld)
- *Transport Operations (Marine Pollution) Act 1995* (Qld)
- *Transport Operations (Marine Safety) Act 1994* (Qld)
- *Vegetation Management Act 1999* (Qld).

The EPBC Act requires that any action (i.e. a project, development, undertaking, activity or series or activities) that has, will have or is likely to have a significant impact on a matter of national environmental significance (MNES), or other matters protected under the Act such as the environment of Commonwealth land, requires approval from the Commonwealth Environment Minister. A summary of MNES potentially impacted by the Project is provided in Appendix C.



This Dredging EMP will be revised post Project approval to incorporate the relevant EPBC Act controlled action conditions, the Coordinator-General Report conditions and the requirements of any relevant post EIS approvals. This Dredging EMP (post EIS approvals) will also be revised to comply with the requirements of Commonwealth and State Government EMP Guidelines (e.g. DoEE Environmental Management Guidelines 2014).

Table 3.1 Statutory approvals and documents for Project dredging and dredged material placement

Approval/permit	Permitted activities
ERA 16	
Tidal works	
Allocation of quarry material	
EPBC Act controlled action	



4. Objectives

This Dredging EMP forms part of GPC's Environmental Management System (EMS) and is intended to be a working management document to be implemented during Project dredging activities to ensure legislative compliance and best practice environmental management. This Dredging EMP also provides a structured program for the management of the works to ensure that all reasonable and practicable measures will be implemented within an adaptive management framework, to prevent and/or minimise the likelihood of environmental harm being caused during the works.

The objectives of this Dredging EMP are to:

- Define and understand the significance and sensitivities of the environmental values/receptors in the Port (refer Appendix B – Environmental values)
- Provide a summary of environmental aspects (refer Appendices B and C) and potential impacts (refer Appendix E)
- Provide control measures that will be implemented to minimise the potential for environmental harm
- Establish contingency plans and emergency procedures
- Record organisational structures, accountability and responsibility
- Facilitate arrangements for effective communication
- Monitor parameters at environmental receptors to allow an adaptive management response that reduces environmental impacts
- Facilitate an adaptive approach through review of management measures and environmental monitoring outlined in this Dredging EMP and implementing appropriate changes to achieve desired environmental outcomes
- Inform the objectives and actions included in the Project Environmental Monitoring Procedure (the Procedure in Appendix A)
- Ensure all staff and contractors are trained and aware of legislative requirements pertaining to the works as well as commitments made in this Dredging EMP
- Ensure appropriate records are kept
- Ensure that reviews of environmental performance and continual improvement are undertaken periodically.



5. Implementation

Prior to the commencement of the Project works, this Dredging EMP will be revised and submitted to the Department of Environment and Energy (DoEE) and the Department of Environment and Science (DES) for review and approval. The Procedure will also be revised and submitted to both DoEE and DES for review and approval prior to implementation.

Project works will not be undertaken in a way which:

- Contravenes this Dredging EMP (which will incorporate the relevant Project EIS commitments and environmental approval conditions which allow the Project to proceed)
- Is inconsistent with GPC's EMS.

Where there is conflict between this Dredging EMP and documents compiled by an engaged contractor, conditions imposed in this plan by GPC will prevail. All relevant staff and contractors will be introduced to and made familiar with the provisions of this Dredging EMP and with the procedures and processes which will achieve the objectives relevant to this plan.

Following the commencement of works, amendments to this Dredging EMP and associated documents must be communicated to and approved by the GPC Environment Manager and Port Infrastructure Planning Manager. Any changes to this plan must also be communicated to and approved by the DoEE and DES prior to the changes being implemented. Changes of a minor nature will not require resubmission of the EMP to administering authorities.

5.1 Dredge Technical Reference Panel

A Dredge Technical Reference Panel (DTRP) will be established for the duration of the Project to provide recommendations and scientific advice for water quality management in the initial stage and to oversee the development and implementation of the environmental monitoring program. The DTRP will comprise scientific experts in water quality, seagrass and benthic habitat as well as management, regulators and dredging technical advisors.

The DTRP membership and terms of reference will be established by the GPC Environmental Manager in consultation with the DoEE and DES prior to dredging commencing.

5.2 Management responsibilities under the Dredging EMP

Throughout the dredging works, the overall management of the Project will be under the supervision of the GPC with day to day control of the Project under the appointed contractor/s. The GPC Environment Manager will be the main point of contact in relation to the implementation of this Dredging EMP. Other responsibilities under the Dredging EMP are outlined in Section 6.6.

This EMP (and associated plans) will be provided to the appointed contractor as it will form part of their contract conditions. The dredging contract will require the contractor to comply the mitigation measures and other requirements contained in this EMP, including regular reporting of compliance to GPC.



6. Environmental Management System

Activities carried out by GPC for the Project dredging and dredged material placement will conform to GPC's AS/NZS ISO14001 certified EMS. This EMP and its associated documents form part of GPC's EMS.

The EMS Plan #146256 is the overarching directory of the EMS for all sites within GPC, and allows any person easy access to any/all documents contained within it. The EMS Plan is a concise overview of the framework used to manage environmental risk. The aim of the plan is to be a user-friendly tool in the form of a directory to quickly guide the user to the desired area of the EMS.

The EMS is an evolving system and is constantly being evaluated and improved when required. Figure 6.1 is a schematic detailing the inputs, outputs and tools utilised in the EMS.



Figure 6.1 EMS schematic

The provision of services by the dredging contractor will be underpinned by the implementation and continual improvement of a management system consistent with the elements of:

- AS/NZS ISO 9001 Quality Management Systems
- AS/NZS ISO 14001 Environmental Management Systems
- AS/NZS 4801 Occupational Health and Safety Management Systems.

6.1 Environmental Policy

The GPC Environmental Policy #366016 defines the overall aims and direction of GPC towards the environmental management of its activities and commitments to continual improvement. It also describes the direction and responsibilities of GPC in relation to its environmental performance.



6.2 EMS legislation

Environmental management of port operations has numerous and varied legislative controls which govern the way GPC conducts its business. To be aware and understand all of GPC's compliance obligations, GPC has developed the two registers below.

1. Legal Register #1007885 describes firstly, what the legislation is and means, and secondly, how it affects GPC activities. The register is regularly updated to ensure that it captures relevant legislative changes and incorporates new development approvals, permits and registrations applicable to GPC operations.
2. Conditions Register #1292854 identifies GPC's existing approvals, each condition and how GPC meets the condition requirements.

Section 3 details the environmental legislation relevant to this Project.

6.3 Environmental risks

GPC's Risk Management Framework provides the processes to ensure the EMS suitably identifies, analyses and evaluates, manages and monitors all aspects under the control or influence of GPC. The risk management process is an integral component of GPC's organisational and operational decision making and ensures all elements of potential impacts are assessed (i.e. environmental, compliance, interested parties (stakeholders), project delivery, etc).

Risk assessments are conducted for all new or changed activities prior to each dredging campaign ensuring risk controls are current, appropriate, communicated, implemented and monitored.

Environmental risks for dredging and dredged material placement are assessed and recorded on the GPC Risk Register #764185 in accordance with the GPC Risk Management Policy and Risk Management Standard #829152. The implementation and effectiveness of risk controls are monitored through processes such as periodical risk reviews, audits, inspections, incident and complaint investigations, and reporting.

6.4 GPC Environmental Strategy

The GPC Environmental Strategy #801782 establishes GPC's overall approach and priorities for environmental management. The Strategy has been developed taking into account GPC's Environmental Policy, its environmental impacts and relevant legal and other requirements. The Strategy provides an overview of the environmental issues relevant to GPC's operations and documents GPC's environmental initiatives proposed to be undertaken to enable environmental objectives and targets to be achieved.

6.5 GPC Environmental Standards

GPC has implemented the following standards to provide clarity of obligations, responsibilities and expectations for environmental management:

- GPC Environmental Management Standard #809151
- GPC Safety, Environment and Security Standard for Contractors and Port Users #995910.

All activities must be conducted in accordance with these standards.

6.6 Environmental roles and responsibilities

GPC staff and contractors are responsible for the environmental performance of their activities and compliance with the approvals relevant to the Project.



GPC staff and contractors are also responsible for complying with the general environmental duty as set out in Section 319 (1) of the EP Act which states:

‘A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to minimise the harm.’

Table 6.1 provides a summary of the responsibilities and accountabilities associated with the implementation of this Dredging EMP, including GPC staff and the dredging contractors.

Table 6.1 Environmental roles and responsibilities

Position	Responsibility	Reporting to
GPC		
Port Infrastructure Planning Manager	Dredging contract. Implementation of this Dredging EMP and responsible for reporting to the relevant authorities.	Port Strategy and Development General Manager
Civil/Structural Engineer	GPC contact for operational issues and management of contractor.	Port Infrastructure Planning Manager
Port Strategy and Development General Manager	Overall responsibility for Environmental Policy, strategy and EMS framework.	Chief Executive Officer
Environment Superintendent	Ensure environmental management, reporting and auditing responsibilities are met.	Port Strategy and Development General Manager
Environmental Specialist - Compliance	Responsible for monitoring the of Dredging EMP implementation and compliance with approval conditions.	Environment Superintendent
Environment Advisor Monitoring and Measurement	Responsible for the coordination of GPC environmental monitoring programs.	Environment Superintendent
Environment Emergency Hotline	General and afterhours contact for the GPC environmental team.	Environment Superintendent
Dredging contractor		
Vessel Master	Responsible for all aspects of vessel shipboard management. Including the complying with applicable management actions within this Dredging EMP.	Manager Dredging Operations



Position	Responsibility	Reporting to
Contractor's Environmental Officer (CEnvO)	<ul style="list-style-type: none"> Understand the contents of and the reason for implementing the elements of the Dredging EMP Ensures adequate training in the elements of the Dredging EMP is provided to all personnel Ensure that personnel involved in the Project, including subcontractors, suppliers and visitors, have received the relevant environmental training required to ensure they are aware and understand their responsibilities under the Dredging EMP and environmental approvals Reporting all environmental incidents to GPC and lead incident investigations related to any incidents that may occur Regularly inspect and monitor all activities for conformance to the Dredging EMP and compliance with all Project approval conditions Assist and advise subcontractors and staff of environmental requirements and potential detrimental environmental impacts as required Implementation and monitoring of the Dredging EMP. 	Vessel Master/Manager Dredging Operations
Marine Operations Manager	Management of overall operations of dredger.	Senior Manager Dredging

6.7 Contractor management

GPC will engage a contractor to undertake dredging and dredged material placement on its behalf. GPC has obligations to ensure that the activities undertaken by, or on its behalf, do not present unacceptable risks to the environment. To ensure the activities of contractors are identified, assessed and managed the following contractor management controls are in place:

Identify and assess all environmental aspects and impacts related to the tasks undertaken by the Principal contractor, subcontractors and suppliers

- Ensure environmental outcomes and requirements are delivered through the implementation and monitoring of this Dredging EMP
- Ensure all supervisory, management staff, employees, subcontractors and suppliers receive the relevant environmental instruction in relation to the Dredging EMP and be made aware of and understand their obligations and duties
- Ensure that appropriate and adequate resources are allocated to allow for the effective implementation and maintenance of this Dredging EMP
- Preparation of a detailed EMP that must address the requirements set out in this Dredging EMP, the EPBC Act controlled action conditions, the Coordinator-General's Report and any additional Project approval conditions
- Submission of the dredging contractor's Dredging EMP to GPC for approval three months prior to dredging commencing



- Implementation and monitoring of the Dredging EMP
- Ensure periodic reviews of environmental performance
- Report all environmental incidents that occur to GPC and ensure that all regulatory timeframes for reporting are able to be met.

6.8 Environmental monitoring

GPC conducts a range of environmental monitoring programs to monitor operational activities that can have an actual or impacts on the environment. It informs adaptive management, compliance and performance review, risk assessment and continual improvement processes for managing dredging as detailed by this EMP.

GPC will implement environmental monitoring outlined in this EMP (refer Section 8) and the Procedure (refer Appendix A) for dredging associated with the Project in order to achieve the following outcomes:

- Compliance with the Project environmental approval conditions
- Ensure an adaptive management framework by adjusting operations in response to environmental monitoring results.

The Procedure includes the following aspects:

- Significant and sensitive receptors in the port area are identified and mapped
- All licenced discharges are monitored
- Ensure any unplanned releases will have adequate monitoring to assess potential impacts
- The methods for collection and analysis of samples (including specific areas to be monitored, when monitoring is undertaken and duration of monitoring)
- The methods of analysing the data and responding to the results to ensure compliance with the conditions
- Reporting intervals
- Review of environmental performance is undertaken periodically to ensure an adaptive management framework is achieved.

To achieve the above, compliance is required with the Procedure as well as this Dredging EMP.

6.9 Measures, plant and monitoring equipment

GPC will install, maintain and operate all relevant measures, plants and monitoring equipment in a way which ensures compliance with the conditions of this Dredging EMP and relevant Project approvals. There will be no change, replacement, alteration or operation of any plant or equipment if the change, replacement, alteration or operation will increase or is likely to substantially increase the risk of environmental harm during works.

It is the contractor's responsibility to ensure that they install, maintain and operate all relevant measures, plant and equipment utilised in their scope of works in order to ensure compliance with the conditions of this Dredging EMP, associated plans and relevant approvals.



6.10 Environmental training

GPC will ensure that employees and contractors working at GPC facilities have received the appropriate level of environmental training and that all relevant records are retained in accordance with the GPC Learning and Development Standard #934182.

GPC employees have training and awareness delivered in a variety of ways which begins with inductions, and mandatory training and then progresses to an individual learning and development plan.

Environmental awareness is achieved not only through training, but by also using a variety of medias, such as:

- Internal and external publications
- Weekly environmental performance report
- Environmental toolboxes
- Digital communication screens
- Consultation with stakeholders through review processes.

It is the contractor's responsibility to ensure that all personnel, including subcontractors, are suitably trained for all activities for which training is required in order to ensure legislative compliance and prevent environmental harm during normal operation and in emergencies or under the close supervision of a suitably trained person.

6.11 Environmental audits and inspections

Internal auditing will be undertaken every 3 months during Project activities, and may also be undertaken at other times to confirm that activities are carried out in accordance with the defined requirements set out in this EMP and relevant approvals. Audits are initiated and completed by the GPC Environment team or by a suitably qualified auditor nominated by the GPC Environment team. Audit reports may be provided to GPC regulators as and when required.

If requested by GPC, GPC staff will be afforded access to witness, inspect, examine or audit any part of the contractor's operations. If requested by a regulatory agency, nominees of the relevant agency will be afforded access to witness, inspect, examine or audit any part of the operations.

GPC will carry out periodical inspections. Records of these inspections along with any corrective or improvement actions arising from inspections or audits will be entered into GPC's incident management system Cintellate.

6.12 Independent environmental auditing

Within the first two weeks of commencing dredging an independent environmental audit of compliance with Project approval conditions and requirements of this EMP and the Procedure will be undertaken. GPC will obtain DoEE and DES approval for the nominated independent auditor and the audit criteria, if required.

6.13 Complaints

There are several ways that GPC can become aware of environmental complaints, this includes notification from terminal customers, employees, contractors, community members and regulators.



The Environmental Complaints Management Procedure #1044716 details how to notify, identify and escalate, respond to and review complaints ensuring effective complaints handling. Complaints received will be entered into Cintellate. The records in Cintellate will include all relevant details of the incident and/or complainant, details of any immediate corrective actions, investigations and/or monitoring undertaken, conclusions formed and improvement actions identified to reduce the risk of reoccurrences.

GPC's Environment Manager and Port Infrastructure Planning Manager must be notified by GPC staff and/or the engaged contractor on receipt of a complaint regarding perceived or real environmental nuisance or harm as a result of an activity specific to the works covered by the scope of this EMP and any other associated works immediately.

The following details must be collated for all complaints received. GPC will provide this information to DoEE and/or DES on request:

- Time, date, name and contact details of the complainant
- Reasons for the complaint
- Any investigations undertaken
- Conclusions formed
- Any actions taken.

6.14 Non compliances and incidents

GPC's Environment Manager and Port Infrastructure Planning Manager must be notified as soon as practical after GPC and/or engaged contractor has become aware of any non-compliance specific to activities covered by the scope of this EMP and any other associated works.

This notification is to take place in accordance with the following methods and timeframes:

- Verbal notification immediately after occurrence of incident to GPC's Environment Manager
- Written notification within 24 hours of occurrence of incident to GPC's Environment Manager.

GPC must notify DES and/or DoEE of any incident resulting from activities undertaken as part of the works which:

- Causes or has the potential to cause environmental harm, or
- Is unlawful, or
- Involves the release of a contaminant, or
- Marine megafauna injury or death, or
- Identifies a new environmental risk, or
- Is not in accordance with the relevant approvals and/or permits.

GPC (or the contractor) must telephone DES's Pollution Hotline (1300 130 372) immediately after becoming aware of any incident involving injury, fatality or other harm to any species of turtle or marine mammal during dredging activities.

For other incident types GPC (or the contractor) must report to DES's Pollution Hotline (1300 130 372) and/or DoEE (02) 6274 1694 as soon as practicable, but no later than 24 hours after becoming aware of a reportable event, in accordance with the conditions of the appropriate approval.



If GPC and/or engaged contractor becomes aware of material environmental harm or serious environmental harm as defined under the EP Act as a result of carrying out the activities covered by the scope of this EMP or other associated works, then the said activity(s) must be ceased immediately.

If at any time during the course of dredging or dredged material placement activities, an environmental incident occurs or an environmental risk is identified, all reasonable measures must be taken by GPC to mitigate the risk or impact.

Incidents are recorded in the Cintellate system and holds all relevant details of the incident, including immediate corrective actions, investigations and/or monitoring undertaken, conclusions formed and improvement actions identified to reduce the risk of reoccurrences.

Written advice will be provided by GPC (or the contractor) to the relevant administering authorities in accordance with the conditions of the appropriate approval. The following details may be required:

- Name of the registered operator, including development approval number
- The name and telephone number of a designated contact person
- The location of the release/event
- The time of the release/event
- The time you became aware of the release/event
- The suspected cause of the release/event
- The sensitive receptor(s) that may have been impacted
- A description of the resulting effects of the release/event
- The results of any sampling performed in relation to the release/event
- Actions taken to mitigate any environmental harm and or environmental nuisance caused by the release/event
- Proposed actions to prevent a recurrence of the release/event.

GPC's Incident Management and Investigation Procedure #1075526 is used to guide incident reporting, external notifications, investigations and corrective actions, including record keeping requirements. The contractor's incident reporting procedure will be included in the Contractor's EMP and must include the requirements outlined in this EMP.

GPC also records and communicates the number and type of incidents internally through weekly, monthly and annual reports.

6.15 Emergency preparedness

6.15.1. General requirements

GPC has documented policies, standards and procedures which provide a framework for ensuring GPC develops and maintains capacity to efficiently prepare for, respond to, and recover from, an emergency, major business disruption and/or crisis event.

The following documents outline GPC requirements for emergency preparedness and will be reviewed by, and requirements adhered to, by the dredging contractor prior to any commencement of dredging:

- Risk Management Policy #924357
- Business Resilience Standard #852778
- Crisis Management Procedure #872678.



GPC is responsible for first-strike response to oil spills, within the boundaries of the port, in accordance with the MSQ First-strike Oil Response Plan attached in Appendix D of this Dredging EMP.

All emergencies and incidents must be reported, however in the event of an oil/hazardous substance spill to water, the Harbour Master (07 4973 1200) is to be contacted immediately. Secondary contact is to then be made with the First Strike Oil Response Team Leader on 0409 629 413.

The Contractor's Emergency Procedures are detailed in their EMP.

6.15.2. Contingency planning

Although management measures cover most potential impacts, contingency arrangements are required in the event of emergency or abnormal operations. These may include but are not limited to:

- Operations in adverse weather conditions (e.g. cyclones)
- Marine incident.

In abnormal operating circumstances, the Environment Manager and Port Infrastructure Planning Manager will be contacted to formulate and advise the Vessel Master of GPC's preferred course of action to minimise environmental harm.

It is noted that the Vessel Master has ultimate responsibility for the vessel and crew, so will make decisions based on risk with consideration to GPC's advice. The Vessel Master is also responsible for consulting with Maritime Safety Queensland (MSQ) and ensuring their requirements are met.

6.16 Records

All records required by this Dredging EMP, associated documents and the relevant approvals must be kept for at least 5 years. Records will be kept in either of the following secure repositories:

- GPC's Risk Management System – Cintellate
- GPC's Document Management System – EDocs.

This will include as a minimum:

- Daily records of the area(s) dredged in relation to the approved footprint of works (using a verifiable method), the volume of material removed (to the nearest tonne) and where these volumes are placed within the WBE reclamation area
- Conformances and non-conformances in relation to the requirements of this EMP
- Monitoring, incident and complaints records
- Correspondence with the administering authority as per approval requirements.

All records required by the relevant approvals must be kept for at least 5 years. Records will be kept in either of the following secure repositories:

- GPC's Compliance Management System – Cintellate
- GPC's Document Management System – EDocs.

All records required by this EMP and associated permits must be provided by the dredging contractor to GPC upon request and/or at the completion of dredging activities.



6.17 Communication

The Port Infrastructure Planning Manager is the main point of contact with the dredging contractor, and is supported by the Civil/Structural Engineer and the GPC environmental team to achieve compliance with the Dredging EMP, associated documents and permits.

Daily interactions occur between GPC and the dredging contractor. GPC dredging meetings will be held as required to track progress and discuss environmental issues with the GPC environmental team.

GPC is the main point of contact for external parties in regards to dredging activities in the Port of Gladstone. The dredging operator will initiate emergency response calls, incident and complaint notification to GPC, investigation and reporting for works under their contract scope and the scope of their EMP. The dredging contractor will initiate emergency response calls for any matters outside of their scope of works in the event that the GPC main point of contact is unavailable.

6.18 Review

This Dredging EMP, its operation and implementation, and its associated documents, will be reviewed following the findings of internal and external audits, and/or in the event that a performance indicator is not met.

Revisions are to be kept as a new version in GPC's document management system and if commitments are added or changed, must be communicated to and approved when necessary by all relevant GPC staff, engaged contractors and administering authorities. Changes of a minor nature will not require resubmission to administering authorities.



7. Activity description

7.1 Overview

The key components of the EMP are summarised below.

- Construction of the WBE reclamation area bund walls and BUF prior to dredging commencing
- Initial dredging works by a cutter suction dredger (CSD) and trailing suction hopper dredger (TSHD) of approximately 0.25 million cubic metres (Mm³) of seabed material (including dredging tolerance) to establish a barge access channel to allow barges to transport dredged material from the Gatcombe and Golding Cutting shipping channels to the WB and WBE reclamation areas (refer Figure 7.1)
- Dredging approximately 12.6Mm³ of seabed material (including dredging tolerance) using a TSHD to duplicate the Gatcombe and Golding Cutting shipping channels (Stage 1 and Stage 2) (refer Figure 7.2 and Figure 7.3)
- Implementing a dredging methodology that involves a TSHD placing the dredged material into barges which transport the material to the BUF adjacent to the existing WB reclamation area. Once the barge is docked within the BUF, excess water will be pumped onshore into the WBE reclamation area. Each barge will be unloaded via large excavators into trucks and/or conveyors for placement within the WB and WBE reclamation areas (refer Figure 7.4).
- Dredged material and water management, and licenced discharge from the WB and WBE reclamation areas into the Port of Gladstone
- Provision of services to the Project activities
- Demobilisation of dredging operation.

Notwithstanding the above, it is important to note that during the Project detailed design and tendering process the dredged material placement method may be amended to include (for example) dredged material being placed in the reclamation areas via conveyors and/or pipelines.

7.2 Location of shipping channels to be dredged and material volume

The Project involves the duplication of the existing Gatcombe and Golding Cutting shipping channels that will be parallel to the main shipping channel, facilitating two-way passage. The location of the area to be dredged as part of the Project is shown in Figure 7.2 and Figure 7.3.

The proposed duplicate channel will be approximately 15 kilometres (km) long and dredging is proposed to be undertaken to an ultimate depth of -16.1 metres (m) lowest astronomical tide (LAT), with a channel width (toe to toe) of 200m. The volume requiring dredging (i.e. above -16.1m LAT) is 12.6Mm³ of seabed material (including dredging tolerance) requiring removal and placement during the Project.

Initial dredging of approximately 0.25Mm³ of seabed material (including dredging tolerance) is also required to establish a barge access channel to allow barges to transport dredged material from the Gatcombe and Golding Cutting shipping channels to the WB and WBE reclamation areas.

Two dredging campaign options are proposed and will be selected based on the demand and timing for increasing Port throughput over the next 5 to 10 years. The volumes and likely timing of each dredging campaign option are outlined in Table 7.1.



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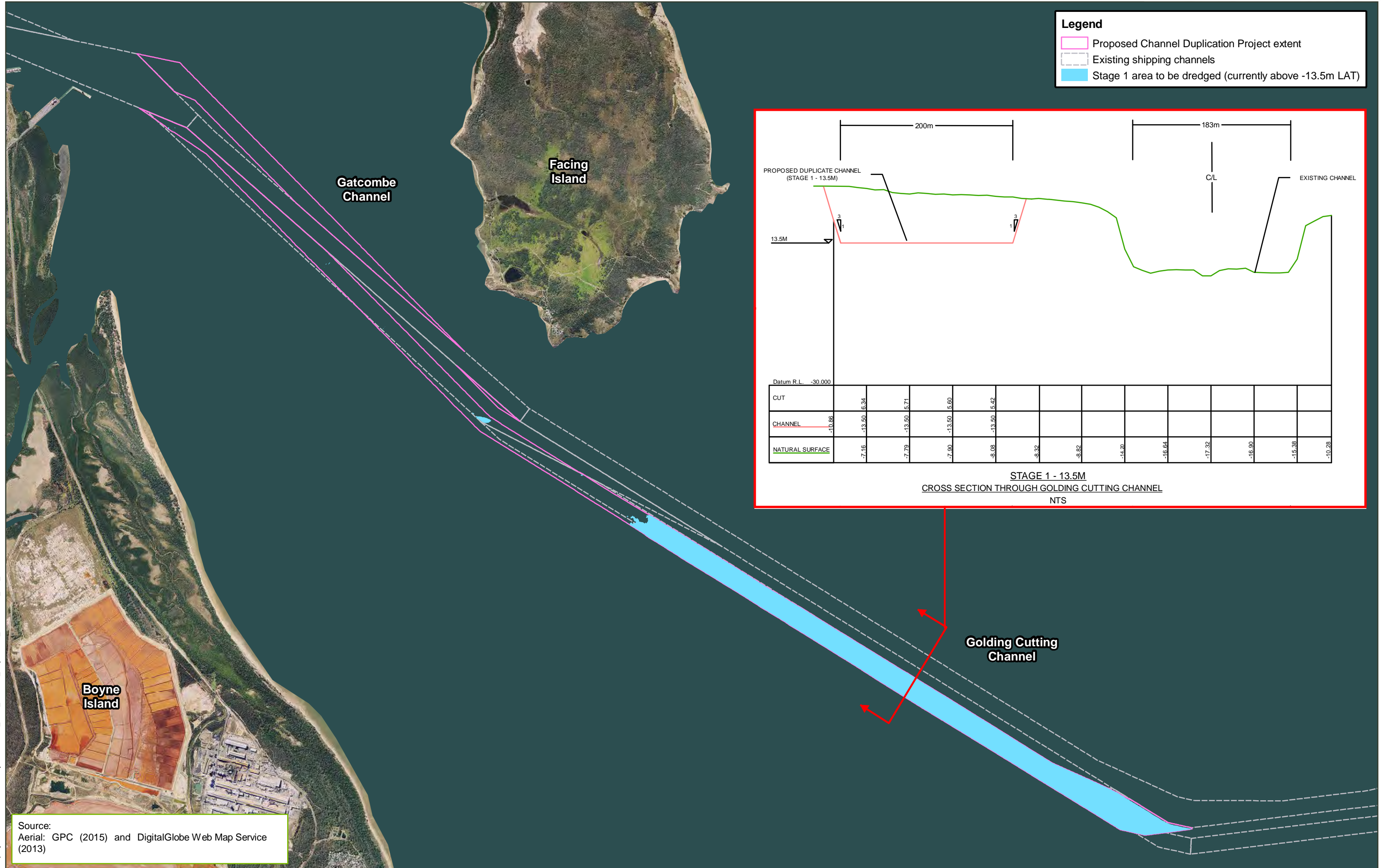


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Gatcombe and Golding Cutting Channel Duplication Project

Figure 7.1: Proposed area to be dredged for barge access channel and barge unloading facility

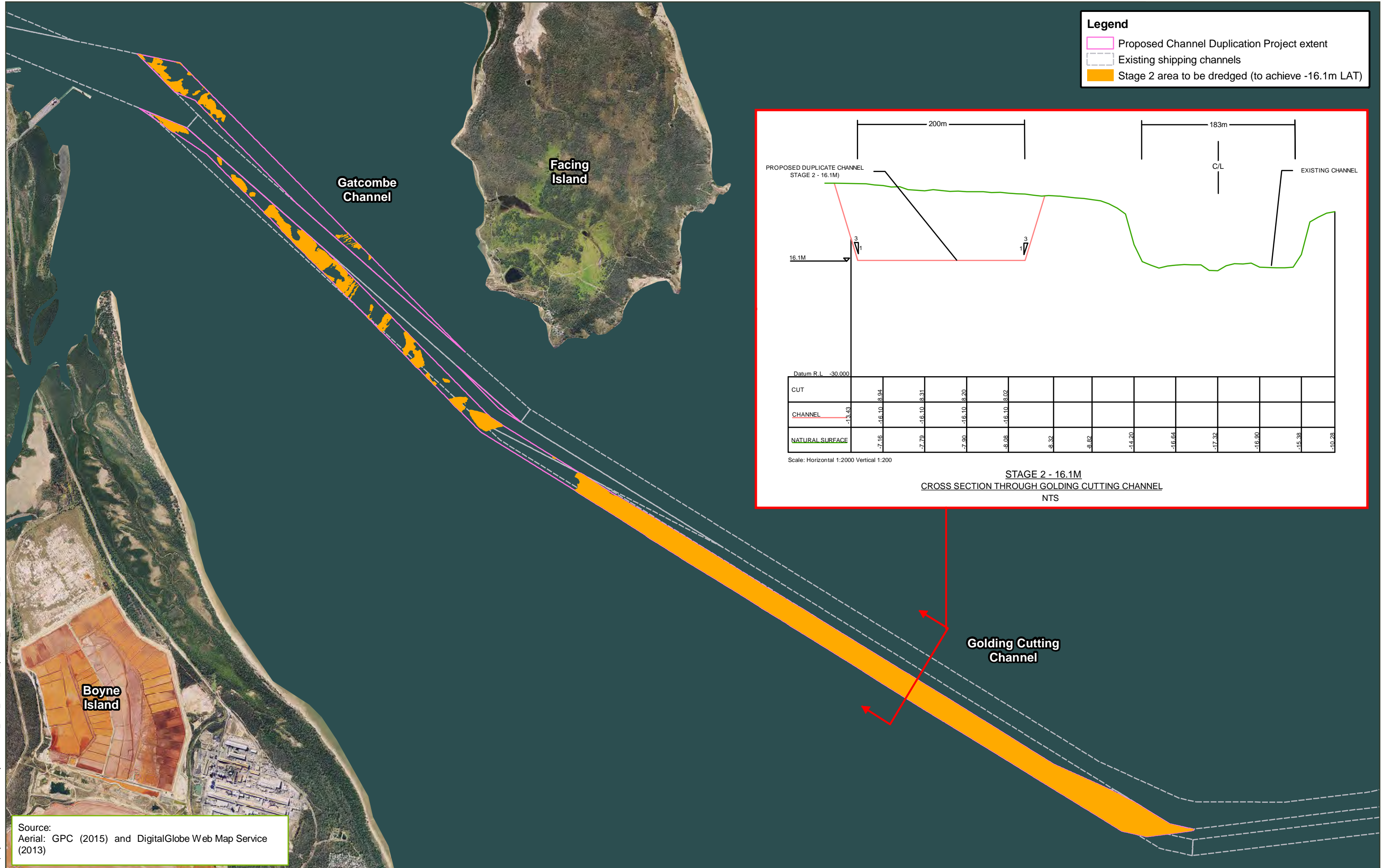


Source:
Aerial: GPC (2015) and DigitalGlobe Web Map Service (2013)

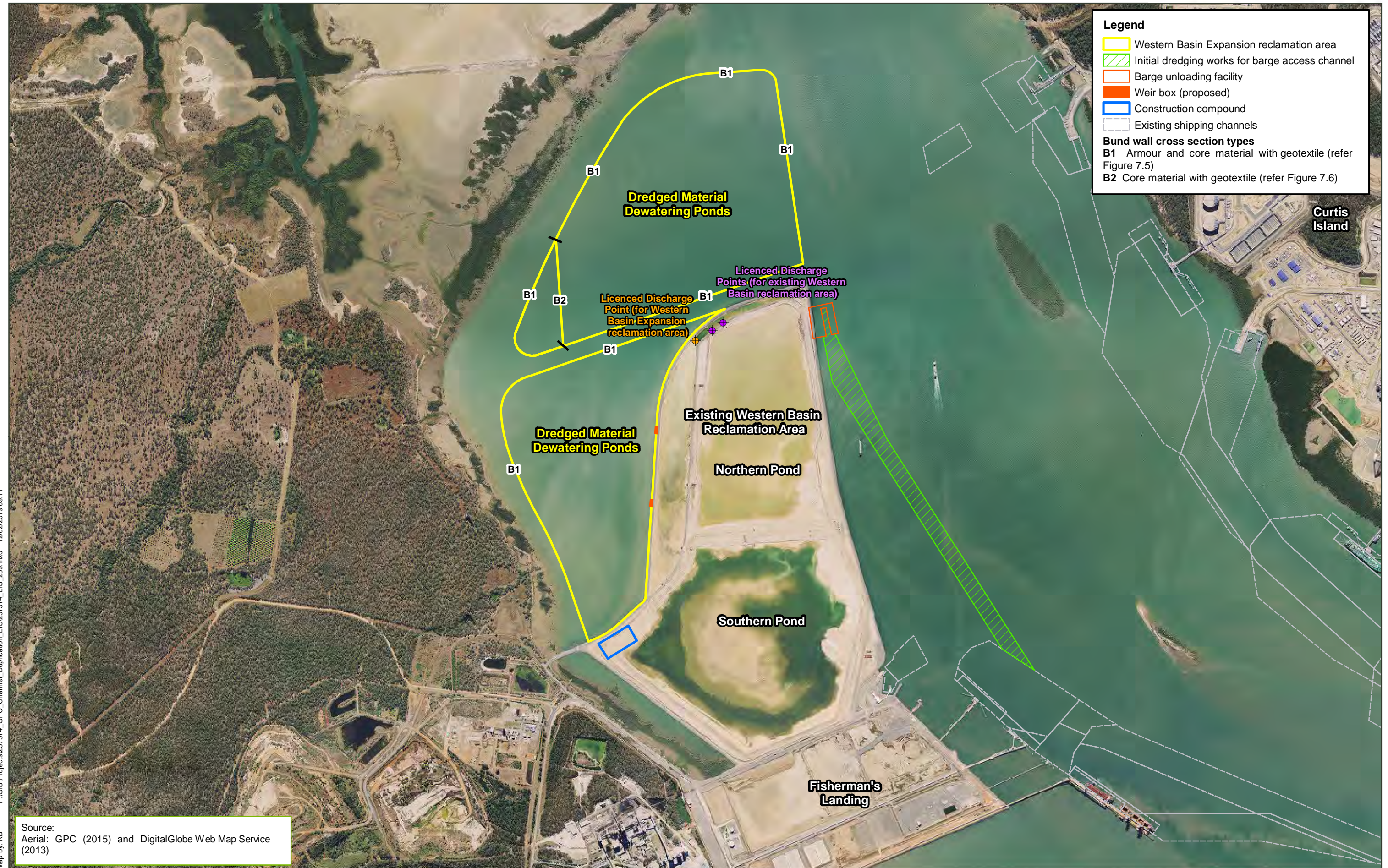


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Gatcombe and Golding Cutting Channel Duplication Project

Figure 7.4: Western Basin Expansion reclamation area



Table 7.1 Dredging campaign and staging options, location and volumes

Stage	Location	Timeframe – likely start date or later (duration)	Design depth (m LAT)	Volume (Mm ³)*
Initial dredging works	Barge access channel	2023 (6.5 weeks)	-7.0	0.25
1	Gatcombe and Golding Cutting Channels	2023 or later (33 weeks)	-13.5	7.25
2	Gatcombe and Golding Cutting Channels	2026 or later (25 weeks)	-16.1	5.35
Singular campaign	Gatcombe and Golding Cutting Channels	2023 or later (58 weeks)	-16.1	12.60

Table note:

* Includes 0.3m (depth) allowance for average dredging tolerance

7.3 Dredging equipment options

Based on the nature and volume of the material to be dredged, availability and limitations of dredging equipment, and location of the WB and WBE reclamation areas, the Project dredging methodology adopted for the Project includes:

- Initial dredging for a barge access channel from the existing Port shipping channels to the BUF, including dredging approximately 0.25Mm³. It is anticipated that a TSHD (e.g. Brisbane) will remove approximately 0.15Mm³ of material from the southern portion of the channel, while a CSD will remove approximately 0.1Mm³ of material from the northern portion of the channel. The dredged material from the barge access channel will be placed directly into the existing WB reclamation area by the TSHD and CSD.
- A large sized TSHD (i.e. 20,000m³ hopper capacity with production in the order of approximately 200,000m³ per week) dredging the Gatcombe and Golding Cutting channel duplication areas
- The dredged material from the TSHD will be placed into a series of large barges (i.e. four barges with a capacity of approximately 7,000m³ to 10,000m³) which transport the material to the BUF adjacent to the existing WB reclamation area. Once the barge is docked within the BUF, excess water will be pumped onshore into the WBE reclamation area. Each barge will be unloaded via large excavators (with a bucket capacity of approximately 7m³) into trucks for placement within the existing WB and WBE reclamation areas. The dredged material placed within the reclamation areas will be managed for dewatering purposes with licenced discharges of excess water into Port Curtis.

Notwithstanding the above, it is important to note that during the Project dredging detail design and tendering process the dredging methodology may be amended to include (for example) dredged material being pumped into barges by a CSD and/or backhoe dredger, and a small volume of dredged material being pumped directly from the hopper of the TSHD into the reclamation area depending on the suitability of the material.



7.4 Sediment quality

A detailed geochemical investigation was undertaken as part of the Project. The investigation was undertaken in the dredging footprint of the Project. A sampling program of boreholes, grab samples and subsequent laboratory analysis was undertaken at the following areas relevant to the Dredging EMP:

- Channel duplication area
- Barge access channel
- WBE reclamation area.

The assessment of Project geochemical data was undertaken in accordance with the *National Assessment Guidelines for Dredging 2009* (NAGD) and also the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (Amendment 1, 2013) (NEPM 2013) as the dredged material will be beneficially reused for reclamation, for which part of the reclaimed land will be used for port-related industrial.

Results from the geochemical investigation demonstrated that all the areas included in the investigation and assessment were demonstrated as 'clean' as per NAGD (2009) and is therefore chemically suitable for placement within the WBE reclamation area.

No contaminants were detected above the NEPM (2013) recreational/open space or commercial/industrial guideline levels, however contaminant concentrations (e.g. manganese and chromium) were detected above the more conservative residential (with gardens/accessible soils) levels.

The proposed land use on the reclaimed land will be port-related industrial, rather than low-density residential. The human health investigation levels for commercial/industrial (e.g. shops, offices, factories and industrial sites) are higher than the residential land use guidelines. For port-related industrial land uses, contaminants in all samples are below these human health risk assessment criteria.

An environmental risk assessment was undertaken in accordance with the process set out in NEPM (2013) in order to assess the risk posed to terrestrial ecosystems from adverse effects of contaminants in soil. There were no contaminants identified at concentrations exceeding the environmental risk assessment.

7.5 Acid sulfate soils

Acid sulfate soil (ASS) investigations were undertaken in conjunction with the geochemical investigation as part of the Project EIS, to determine the likelihood of actual acid sulfate soils (AASS) and potential acid sulfate soil (PASS) being present in the dredged material and the WBE reclamation area.

During the ASS investigations, grab samples were collected placed in plastic bags for laboratory ASS analysis and field pH testing.

7.5.1. Channel duplication area to be dredged

There was generally an absence of ASS across the majority of sediments sampled within the channel duplication area. However, two borehole locations within the channel duplication area to be dredged were identified as containing elevated amounts of net acidity and will require management. In addition, a number of samples from discrete locations and horizons indicated presence of AASS and PASS based on field pH results.



The excess acid neutralising capacity of the sediments was substantially higher than the net acidity of the sediments throughout the area to be dredged, likely due to the presence of shell material. The activity of dredging and movement of dredged material is expected to crush the shells into fine fragments, resulting in all of the calcium carbonate (CaCO_3) content present in the shell material being available to neutralise acid, should it be generated.

7.5.2. Barge access channel

The presence of ASS was evident predominately in the clay and silt material within the northern portion of the barge access channel, although the dredged material contained a high level of acid neutralising capacity, substantially above the net acidity of the sediments, likely due to the presence of shell material. The activity of dredging and movement of dredged material is expected to crush the shells into fine fragments, resulting in all if the CaCO_3 content present in the shell material available to neutralise acid, should it be generated.

7.5.3. WBE reclamation area

The presence of ASS was evident across the majority of sediments sampled within the WBE reclamation area. While there was no evidence of the presence of AASS, almost all sampling locations indicated the presence of PASS throughout the vertical profile. Sediments within the WBE reclamation area also contained a high level of acid neutralising capacity.

7.6 Reclamation area dredged material management

7.6.1. WBE reclamation area

The construction of the reclamation bund walls will commence three years prior to the Channel Duplication dredging commencement. A connection structure (e.g. bridge or series of culverts) will be constructed between the WBE reclamation area (southern area) and the WBE reclamation area (northern area).

As part of the reclamation area concept design and based on experience with similar dredged material in the Port an average bulking factor of 1.25 has been adopted. The bulking factor is the ratio of dredged volume after placement within the reclamation area, to the in situ volume of sediment to be dredged. In relation to the Project, the in situ dredged volume is 12.85Mm^3 , while the volume of the dredged material within the WB and WBE reclamation areas will be 16.06Mm^3 .

The construction of the WBE reclamation area bund walls and BUF will be managed as outlined in the Project EMP.

Table 7.2 provides the Project dredged material volume proposed to be included in the WBE reclamation area.



Table 7.2 Dredged material volume to be managed within the Western Basin and Western Basin Expansion reclamation areas

Project dredging component	Dredged material volumes (Mm ³)		Dredged material volume managed within the WBE reclamation area	
	In situ	Within WB and WBE reclamation areas including bulking factor	Southern area	Northern area
Initial dredging works	0.25	0.31	21.90	
Stage 1 dredging	7.25	9.06	2.30	6.76
Stage 2 dredging	5.35	6.69	2.80 ¹	3.89
Total	14.12	17.655	7.00	10.65

Table notes:

- 1 Including 2.00Mm³ of Project dredged material within the southern area assumes that there is a four year or greater duration between Stage 1 dredging finishing and Stage 2 dredging commencing
- 2 It is likely that only the initial dredging works material and approximately 0.20Mm³ of Stages 1 and 2 dredged material will be accommodated within the existing WB reclamation. It is important to note that the volume of Stages 1 and 2 dredged material could be lower or higher than the 0.20Mm³ included in Table 2.16. The volume of Project dredged material to be included within the existing WB reclamation area will be confirmed during the detailed design phase of the Project.

The existing WB reclamation area and the southern and northern placement areas of the WBE reclamation area (refer Figure 7.4) will be required to accommodate the Project Stage 1 dredged material due to the factors summarised below.

- The limited capacity within the existing WB reclamation area
- The Stage 1 volume of the material to be dredged, bulking factor of the dredged material and the need for managing the dewatering process within both the southern and northern reclamation areas to achieve the quality of tailwater discharge
- The limited size and capacity within the WBE reclamation area (southern area) (111.12ha). As the dredged material is being transported by trucks and not being pumped, as the area starts to fill up, there will be limited space for movement of trucks and equipment given the fact that the dredged material has a high clay content.

Based on Project concept design for the WBE reclamation area and the volume required to manage the initial dredging works and the Stage 1 dredged material volume (i.e. 9.06Mm³ over a 33 week period), implementing the proposed dredging methodology (refer Section 7.3), both the southern and northern WBE reclamation areas are required to be constructed prior to the Stage 1 dredging commencing.

Typical cross sections of the bund wall are provided in Figure 7.5 and Figure 7.6

The bund wall concept design has allowed for storm tide and sea level change of +1.88m above the existing highest astronomical tide (HAT) level at Fisherman's Landing as part of establishing a preliminary bund height of +7m LAT. This is greater than the projected 2100 climate change allowance of 0.87m.

A detailed analysis of storm tide and climate change allowances will be undertaken during detailed design of the bund wall. The existing Fisherman's Landing reclamation area adjacent to the WB reclamation area was constructed to a bund wall level of +6m LAT and the WB reclamation area was constructed to a bund wall level of +7m LAT. This level has been adopted for the WBE reclamation area bund wall for preliminary design and EIS purposes.



The Project dredged material placement within the WBE reclamation area has been assumed to reach up to a maximum height of +8m LAT within the enclosed bund walls to cater for surface drainage gradient.

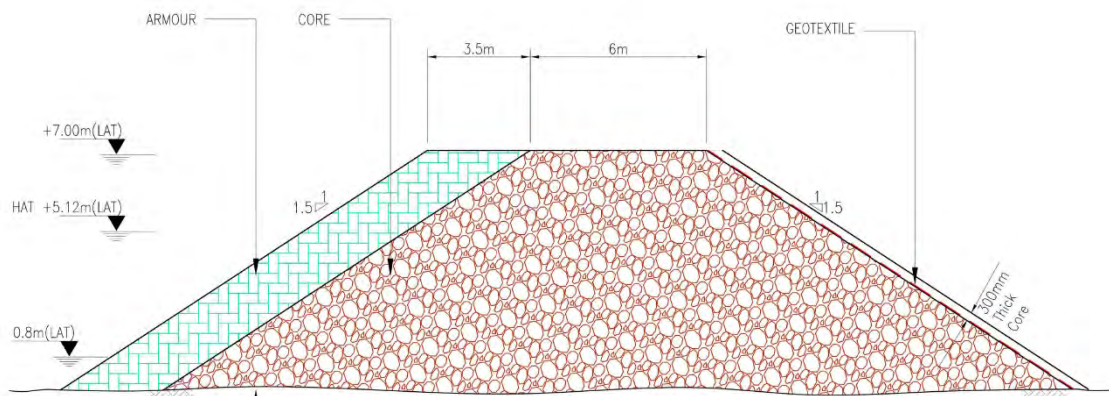


Figure 7.5 Western Basin Expansion typical section of bund wall armour, core and geotextile (bund wall type B1)

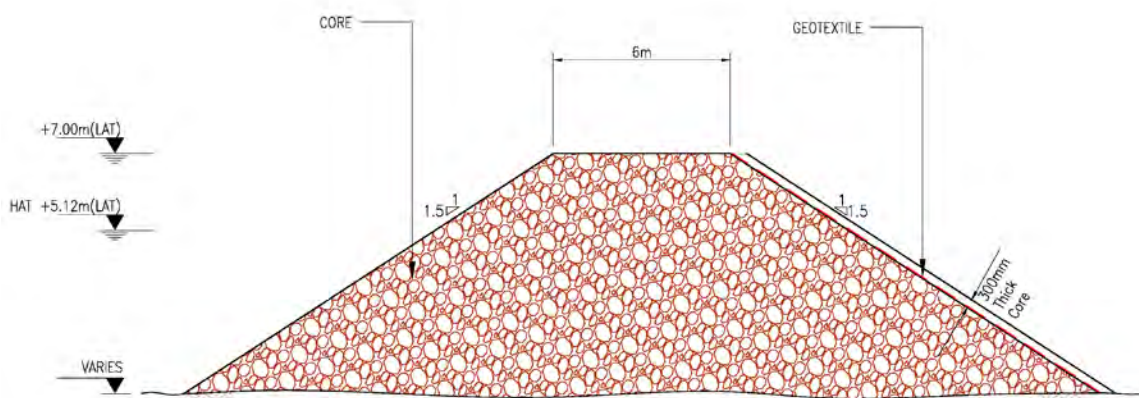


Figure 7.6 Western Basin Expansion typical section of bund wall core and geotextile (bund wall type B2)

Approximate bund wall material volumes are summarised in Table 7.3. The final material volumes for the reclamation area will be determined during the detailed design phase of the Project.



Table 7.3 Western Basin Expansion bund wall material volumes

Rock type	Description	Weight range (kg)	Southern area approximate quantity (m ³)	Northern area approximate quantity (m ³)	Total approximate quantity (m ³)
Armour	Hard, durable rock, of a size suitable for use in the marine environment, as revetment/armouring to withstand environmental conditions	200 to 300	60,000	113,000	173,000
Core	Hard, durable rock also suitable for use in the marine environment, but typically of a smaller size to the armour, to be used to form the core of the bund wall	10 to 100	387,568	567,730	955,298
Total rock volumes			447,568	680,730	1,128,298

Table notes:

Rock density is 2.6t/m³

Quantity volumes are based on a 1.3 allowance for sinkage and contingency

Core material will contain fines (approximately 5%) to assist in the sealing of the outer bund wall

Refer Figure 7.5 and Figure 7.6 for the typical cross section location of rock types

During the placement of dredged material within the WB and WBE reclamation areas, a series of decant ponds will be constructed internal to the outer bund wall to allow for the fine material to settle from the tailwaters. The internal ponds will be designed to store the soil-water mix for a sufficient time, as to allow the suspended sediments in the discharge water to reduce to acceptable levels (i.e. less than or equal to 100mg/L). The dewatering discharge water will be released into Port Curtis at the locations shown in Figure 7.4.

The final decant pond configuration and design will be undertaken during the detailed design phase of the Project. The final decant pond will also capture stormwater discharges from within the reclamation area and the final land use.

7.6.2. Proposed dredged material placement method

Once the outer reclamation and internal bund walls are complete, and the geotextile material is restrained and stabilised, dredged material will be transported into the WB and WBE reclamation areas. Dredged material and water mix will be placed by trucks into primary internal cells to be filled out in turn, a secondary cell and final polishing cell will be utilised to ensure the decant waters flow and facilitate discrete settling of suspended particles.

Dredged material placement within the WB and WBE reclamation areas will be mounded to the final profile as much as possible from direct placement from the trucks.

The ratio of solids over transport water is a function of the available power on the dredger pumps, as well as the type of material, cut height, pipeline diameter and the delivery distance. It is estimated that the tailwater flows may vary from 5,000m³ to 30,000m³ per day. This tailwater flow rate is indicative only and will be finalised with the selected dredging contractor.



The internal dewatering cells will be designed to ensure the surface area and volume is large enough, and the detention time is sufficient to meet the required decant water quality licenced discharge limit (i.e. less than or equal to 100mg/L). Variable height weir boxes will be installed between the cells, allowing the rate of discharge and movement of waters between cells to be controlled. The cells will be designed and maintained so that a freeboard of not less than 0.5m is maintained at all times during the dredging operation.

Two decant licenced discharge points will be utilised for the existing WB reclamation area, and one decant licenced discharge point from the WBE reclamation area to release water into Port Curtis. The location of the discharge points for the WB and WBE reclamation areas are shown in Figure 7.4. A conventional drop inlet structure fabricated from pre-cast reinforced concrete items will be installed and connected to an outlet culvert through the bund wall.

7.7 Associated infrastructure

The Port of Gladstone's maritime infrastructure is made up of a variety of wharf facilities, channels, two dredged material placement sites and reclamation areas which have been identified as required for future port facilities.

- The Port is made up of six wharf facilities, Fisherman's Landing, R G Tanna Coal Terminal, Auckland Point Terminal, Barney Point Terminal, South Trees Wharf and Boyne Island Wharf, comprising 15 berths
- Newly developed Curtis Island infrastructure for LNG is made up of three wharf facilities, Queensland Curtis LNG (QCLNG), Gladstone LNG (GLNG) and Australia Pacific LNG (APLNG)
- Newly developed Wiggins Island Coal Terminal (WICT) wharf facility
- The Port channels total approximately 40km in length from Fisherman's Landing and the LNG precinct to the Fairway Buoy at the mouth of Port. The majority of channels are approximately 180m wide and 16m deep (LAT). The middle and inner harbour channels have varying widths and depths.

The Port's shipping channels, swing basins, berth pockets require maintenance dredging annually to ensure the design depths are maintained for vessel movements.

7.8 Key tenancies and stakeholders

Identified tenancies close to the works and key stakeholders may include but are not limited to:

- LNG Project proponents
- GPC contractors
- Surrounding industries and their wharf centres
- Local residents and community
- Government agencies
- Other users of the Port of Gladstone
- The GPC Stakeholder Representative Group.



8. General environmental management measures

8.1 Dredging operation

8.1.1. Environmental objectives

The environmental objectives of the dredging operation are to:

- Limit impacts of dredging and dewatering operations on marine life and water quality to an extent consistent with protecting the viability of specified communities
- Limit sediment (turbid plume) mobilisation to an extent consistent with protecting the viability of specified communities
- Limit the amenity impacts of increased turbidity in the Port
- Achieve compliance with environmental nuisance laws and relevant noise and vibration criteria for dredging
- Achieve the objectives outlined in the Procedure
- Minimise indirect impacts to the surrounding environment and marine flora and fauna species (including conservation significant species), and reduce direct impacts to the extent necessary to enable the safe operation of the Project
- To ensure that marine protected species, including dolphins, dugongs, turtles and migratory shorebirds are not directly adversely affected by dredging activities
- Establish a strategy for effective operation and management of dredging works and associated Port terminal operations.

8.1.2. Performance criteria

The performance criteria of the dredging operations are:

- No exceedance of turbidity and BPAR internal alert trigger levels as specified in the Procedure
- Compliance with all Commonwealth and State approval conditions
- Noise from dredging activities must not cause an environmental nuisance at any 'noise sensitive place' as defined under the Environmental Protection (Noise) Policy 2008
- No complaints received regarding excessive noise or vibration due to dredging activities
- No fatalities or injuries to marine fauna or migratory birds associated with dredging or dredged material placement activities
- Disturbance to marine habitat will be restricted to the minimum required to enable the safe construction and operation of the Project, in accordance with the relevant approval conditions
- Implement an appropriate response where monitoring determines that the seagrass and coral health is found to be compromised by dredging activities.

8.1.3. Dredging equipment

- Dredging equipment and dredging methodology will be selected on the basis of dredger availability, the nature of the material to be dredged, consideration of environmental impacts, minimisation of dredging timeframes and compliance with Project conditions and this Dredging EMP
- During selection of dredging vessels, the total emissions and characteristics will be reviewed to ensure that emissions are consistent with NO_x emissions as per International Maritime Organisation (IMO) Tier III and SO₂ emission (reflective of 0.5% fuel sulfur content) requirements



- Dredge plant will conform to Department of Agriculture and Water Resources (DAWR) Guidelines to minimise the risk of the introduction of any introduced marine species
- Where possible, dredge and pump equipment will be fitted with noise suppression devices
- Where practicable, all vessels will be fitted with propeller guards
- Where necessary, noisy plant or equipment will be acoustically treated or housed (refer Appendix E of Australian Standard 2436-1981 for guidance)

8.1.4. Dredging operations

- Dredging and dredged material placement works will comply with the relevant Project management plans, project approvals and Commonwealth, State legislation and regulations
- Dredging and dredged material placement works will be restricted to the extent necessary to enable the safe construction and operation of the Project, including minimising the disturbance to ecologically sensitive areas (i.e. adjacent habitats and seagrass communities)
- Dredging operations will not be undertaken in unsuitable conditions (i.e. outside the operational parameters of the dredge, for example in high energy situations such as storm surges). If the Bureau of Meteorology (BoM) issues a severe weather warning dredging works within the affected area will cease. All other work in adverse weather conditions will be at the sole discretion of the dredging contractor
- All dredging equipment will be operated and maintained in a safe and efficient manner to ensure that water quality impacts and noise levels generated comply with manufacturer specifications
- Prior to dredging, equipment will be inspected to ensure that all required measures are being adopted to reduce potential impact to marine fauna and associated habitats
- Dredging activities must be restricted to the Project's approved areas and depths
- No waste (including sewage) must be released to the environment, stored, transferred or disposed contrary to any conditions of Project approvals
- Waste generated during dredging will be managed in accordance with the waste hierarchy, and must be stored, handled and transferred in a proper and efficient manner to prevent environmental harm
- All waste generated in carrying out the activity will be lawfully reused, recycled or removed to a facility that can lawfully accept the waste. Incompatible wastes will not be mixed in the same container or waste storage area.
- Once the dredging contractor has been appointed, Gladstone Regional Council will be consulted to confirm the dredging activity waste water requirements.
- Where a TSHD is used it will have the following minimum technical specification:
 - Below keel discharge of tailwaters via an anti-turbidity control valve
 - Vessel must have on-board systems for determining solids to water ratio or density of dredged material
 - Vessel must have electronic positioning system for defining the location and depth of dredging activities
 - TSHD dredge heads must be capable of, and have fitted, fauna exclusion devices, including but not limited to, turtle deflectors
 - Barges must be fitted with 'green valves' in the overflow pipe to control the amount of air contained in the excess water (i.e. reducing turbidity)



- Vessel must be registered and in survey as required by Australian law and to the International Maritime Organisation (IMO) guidelines
 - TSHD vessels must be fitted with electronic logging, and the logs must be available to GPC and DES on request
 - Barges will be fitted with computer based equipment for the management of overflow (i.e. to prevent excessive discharge)
 - The above minimum technical design standards and conditions of the TSHD must be supported by appropriate certification, including photographs, provided to DES prior to the commencement of use.
- No blasting will be undertaken under this Dredging EMP. If blasting is needed, this Dredging EMP will need to be amended to include or reference a detailed blasting management plan approved by DES
 - All equipment will be turned off when not in use
 - All equipment on the dredger will be operated and maintained in a safe and efficient manner to ensure that generated noise complies with manufacturer specifications
 - All floating plant and associated moorings will be kept clear of navigational channels when working or moored. The moorings will be marked in accordance with the requirements of the Regional Harbour Master (RHM) or representative.
 - Navigational lights, buoys, marks and any warning signs, which the RHM considers necessary, will be supplied, installed and maintained. All navigational aids must be constructed and operated in accordance with the requirements of the RHM or representative.
 - All flood lighting or other lighting, except navigational lighting, installed on the structure or surrounds must be constructed in accordance with the requirements of the RHM or representative
 - All marine plant and equipment used by the constructing authority must:
 - Comply with all the requirements of ‘Standards of Marine Construction Activity within Gladstone Harbour’ as published on the MSQ website (www.msq.qld.gov.au). Please note that this document is amended periodically.
 - Be maintained to minimise the discharge of noxious fumes and pollutants.
 - The dredging contractor will comply with the relevant requirements within the following documents:
 - *Transport Operation (Marine Safety) Act 1994* and the *Transport Operations (Marine Safety) Regulation 2016*
 - Standard for Commercial Marine Activities – Gladstone Region and preparation and implementation of the approved Project Marine Execution Plan
 - Port Procedures and Information for Shipping – Gladstone
 - Any material which is deposited outside the alignment of the works shown in Figures 7.1 to 7.4, or any debris which falls or is deposited into tidal waters during the dredging will be removed by the constructing authority at its cost and expense prior to the practical completion of the works
 - If, at any time during the course of dredging, an environmental incident occurs or an environmental risk is identified, all measures must be taken immediately by the dredging contractor to mitigate the risk or the impact. The situation is to be reported in writing within one business day, to DoEE, with the details of the incident or risk, the measures taken, the success of those measures in addressing the incident or risk and any additional measures proposed to be taken.



- The dredging contractor must document any incidents involving the dredging and material placement activities that result in injury or death to any EPBC Act listed species. The time and nature of each incident and the species involved, if known, must be recorded and must be reported in writing within one business day, to DoEE.
- The dredging contractor will prepare and finalise a Dredging contractors' Ballast Water Management Plan (BWMP) in accordance with the Australian Ballast Water Management Requirements (Version 6) (Commonwealth Government 2016). The management plan will include contingency measures that include, but are not limited to, the below:
 - Immediate notification to GPC, and the appropriate regulatory agency (e.g. DAWR, DES, MSQ)
 - Corrective actions (i.e. immediate investigation strategies, holding the balance of ballast on board, transferring the balance between tanks, examining ship to shore transfer options, etc.)
 - Consequential reporting/liaison requirements.

8.1.5. Marine fauna

- A marine fauna spotter will be present on all moving vessels larger than 7m in length, at all times. All fauna occurrences will be recorded and reported, as per the relevant approval requirements.
- Immediately prior to the commencement of dredging activities, a search for marine megafauna will be conducted by a suitably qualified and experienced marine fauna spotter, in accordance with the relevant management plans and permit approval requirements
- Dredger heads to be fitted with fauna exclusion devices, including but not limited to, turtle deflectors. This equipment will be appropriately serviced and inspected throughout dredging
- Where trailer suction dredging is carried out, during times when the drag head is not in contact with the seabed, and pumps are in operation, pump speed will be reduced and drag head water jets must be activated to minimise the risk of turtle capture
- For Project vessels speed limits will be enforced to prevent injuries to marine fauna. For Project vessels go slow zones will be established in shallow areas, less than 5m in depth. Vessels travelling in these areas will not travel on the plane.
- Self-powered barges operating in shallow water will be towed into deep water using tugs prior to engaging propellers
- If an animal is injured during construction activities, works in the immediate area of the animal will cease immediately and will not recommence until rescue actions have been taken and a review of appropriate management actions is undertaken to ensure the risk of reoccurrence is minimised
- DES will be contacted to manage any stranded fauna within areas that have the potential to be impacted by Project activities. DES stranding hotline: 1300 130 372.
- In the event that two or more of any endangered or vulnerable species of marine megafauna are fatally injured on any two out of three consecutive days, the dredging operation must stop and not recommence until consultation with DES has occurred and direction has been given by DES to allow commencement
- Retrieved turtle carcasses (and parts of) shall be immediately notified on the RSPCA Hotline 1300 264 625 (1300 ANIMAL), to allow prompt collection by DES for analysis
- Where practicable, lighting solutions will be implemented to reduce potential marine fauna attraction to the Project direct impact area, and to avoid potential habitat fragmentation and fauna disturbance



- Throughout the dredging activity, dredging equipment will conform to DAWR Guidelines to minimise the risk of the introduction of any marine weed species.

8.1.6. Community consultation/receptor controls

- GPC will be informed as soon as reasonably possible of atypical noise and/or vibration event
- Residents will be advised at least 3 days prior to planned atypical dredging noise events occurring
- All noise complaints will be recorded and reported to GPC within 12 hours of receipt of the complaint
- Direct discussions with potentially affected residents are to occur prior to commencement of the dredging activities
- When requested by DES or GPC, noise monitoring will be undertaken by the dredging contractor to investigate any complaint of noise nuisance. DES and GPC will be notified of the results within 7 days of the complaint. Measurement and monitoring will be in accordance with the current edition of the DES Noise Measurement Manual.

8.1.7. Hydrocarbon management

- No hydrocarbons are to be discharged into the environment. Secondary containment for storage of hazardous material will be compulsory.

8.1.8. Cyclone management plan

- Prior to dredging a cyclone management plan will be prepared in consultation with the relevant authorities.

8.2 WBE reclamation area

8.2.1. Objectives

The environmental objectives of the Project dredged material placement and dewatering management are to:

- Limit sediment (turbid plume) mobilisation to an extent consistent with protecting the viability of specified communities
- Reduce the potential impacts from noise generated by dredge equipment
- Achieve compliance with environmental nuisance laws and relevant noise and vibration criteria
- Limit the impact of dewatering operations on marine life and water quality to an extent consistent with protecting the viability of specified communities
- Achieve the objectives outlined in Project EMP.

8.2.2. Performance criteria

The performance criteria of the dredge material placement and dewatering management are as follows:

- Compliance with the decant water discharge limits outlined in this Dredging EMP and in the Procedure
- Compliance with all conditions of all Commonwealth and State Government approval conditions and Project management plans relevant to dredging works
- No injury to marine protected species, including dolphins, dugongs and turtles
- Noise from dredging activities must not cause an environmental nuisance at any 'noise sensitive place' as defined under the *Environmental Protection (Noise) Policy 2008*
- No complaints received regarding excessive noise or vibration due to dredging activities



- Specified mobile plant and equipment will comply with the typical A-weighted sound power levels from site equipment contained in Table D2 of Australian Standard 2436-1981 “Guide to Noise Control on Construction, Maintenance and Demolition Sites”
- Achieve the performance criteria outlined the Project’s environmental management plans.

8.2.3. Management measures

The management measures of the dredged material placement and dewatering management are as follows:

- All decant water will be adequately contained and treated before being discharged into the receiving waters, including gross pollutant and sediment removal. All reasonable and practicable measures will be implemented to prevent pollution resulting from silt runoff and oil and grease spills from machinery
- In the event that discharge occurs, or is likely to occur, at other than the licenced and monitored discharge point, dredging material placement will stop
- Implementation of a decant water monitoring program, as part of the Procedure
- All operating machinery plant will be maintained and operated in an efficient manner to minimise the release of airborne contaminants
- No contaminants will be released from site to any waters, beds, or banks of any waters (including groundwater) unless authorised.



9. Detailed environmental management measures

This section contains the operational and the environmental mitigation measures to be implemented by the Project.

9.1 Acid sulfate soils

ASS investigations found a general absence of ASS and high acid neutralising capacity from the sampled sediments in the barge access channel, channel duplication area to be dredged and the WB and WBE reclamation areas. However, any potential risks of ASS are required to be managed in order to prevent adverse impacts to the receiving environment as a result of ASS.

As a minimum, the controls below will be implemented to manage the risk of potential ASS disturbance. In addition, management of ASS will be in accordance with strategies outlined in the Project ASS management plan (ASSMP).

Objectives	<ul style="list-style-type: none">• Prevent contamination of the marine environment from the disturbance and/or oxidation of ASS material• Ensure no impacts to surface water or marine water quality occurs resulting from the disturbance of ASS material• Ensure no damage to infrastructure or equipment occurs as a result of ASS disturbance and/or handling• Ensure all personnel attend the environmental induction that will include ASS awareness training.
Potential impacts	<ul style="list-style-type: none">• Oxidation of PASS, disturbance of AASS and generation of acid, resulting in adverse impacts to water quality and flora fauna in the vicinity of the Project.
Actions	<ul style="list-style-type: none">• Key personnel will be provided mandatory training in the identification and control procedures for ASS and a register maintained• The dredged material will remain in a saturated state in the barges and during placement in the WBE reclamation area, to minimise the potential for oxidation of PASS. Dredged materials will not be stored in the barges or trucks for more than 24 hours and will be kept saturated.• Dredging of identified PASS 'hot spot' areas will occur within the early stages, where practicable, to allow strategic placement of Project sediments containing PASS within the safe PASS reinternment level (SPRL) in the WBE reclamation area.• Dewatering and lowering of the water table within the WB and WBE reclamation areas will be avoided to maximise the volume of sediment that remains saturated• Material within the bund walls will be re-distributed as required so that it remains permanently under water where practicable, or if exposed to the atmosphere for a significant length of time, it is treated appropriately in compliance with the ASS Management Plan. Significant length of time is defined will comply with the Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines (version 4), including:<ul style="list-style-type: none">- Coarse texture (sands to loamy sands and peats): Overnight (18 hours)- Medium texture (sandy loams to light clays): 2 nights (42 hours)- Fine texture (medium to heavy clays and silty clays): 3 nights, e.g. a weekend (66 hours).• Any runoff from the WB and WBE reclamation areas (sediment above water level) will be directed towards a series of internal ponds and tested (for pH, metals, etc.) prior to



	<p>discharge into Port Curtis via the licenced discharge point. Decant water to be discharged into Port Curtis is to have a pH between 6.5 and 8.5 and adjustments will be made to the pH prior to licenced releases, should the water within the WB or WBE reclamation areas be too acidic or alkaline.</p> <ul style="list-style-type: none"> • Ongoing validation sampling of Project sediments containing PASS above SPRL within the WB and WBE reclamation areas (at a rate of 1 sample/1,000m³), and treatment of PASS materials if required. Validation shall confirm, using SPOCAS analysis, that the sediment has no potential acidity and the laboratory calculated liming rate is < 1kg CaCO₃/tonne.
Performance indicators	<ul style="list-style-type: none"> • No exceedances of trigger values outlined in the ASSMP • No visual observations of ASS impacts • No decline in terrestrial or marine plant health as a result of exposure to ASS or PASS • No decline in the water quality of localised watercourses or the marine environment.
Monitoring	<ul style="list-style-type: none"> • Validation testing of the PASS sediments at a rate of 1 sample/1,000m³ after placement in the WBE reclamation area will be conducted to confirm sediments have sufficient buffering capacity. If samples fail the validation testing, then additional sampling will be conducted to determine extent and location of the ASS material. Management options will be assessed on a case by case basis but will include containment, treatment and validation as per the ASSMP. • Daily monitoring of water quality (e.g. pH, dissolved oxygen, etc.) within internal ponds • Daily inspection of surface waters, and stormwater drainage, in the vicinity of the site, for evidence of impacts, resulting from disturbance of ASS (e.g. fish kill, aquatic/riparian flora mortality and/or iron staining)
	<ul style="list-style-type: none"> • The visual monitoring plan and checklist provided in the ASS Management Plan will be used to identify signs of ASS oxidation, including: <ul style="list-style-type: none"> – Unexplained scalding, degradation, or death of vegetation – Unexplained death, or disease, in aquatic organisms – Formation of the mineral jarosite, and other acidic salts, in exposed or excavated soils – Areas of blue-green water, or extremely clear water, indicating high concentrations of aluminium – A transition to, or establishment of, a community dominated by acid tolerant species – Rust coloured deposits on plants, or on the banks of drains, water bodies, and watercourses, indicating iron precipitates – Black, to very coloured waters, indicating de-oxygenation – Sulfurous (rotten egg gas) smells – Corrosion of concrete, and/or steel structures, in contact with soil or water – Invasion of a community, or area, by acid tolerant species. • Daily inspection of the base of the bund wall for potential impacts of mud wave, resulting in sediment being excavated above the natural level and exposed to oxygen. Should daily inspections observe excavated sediment above the natural level, this will be collected and transported to a containment area for treatment.



Reporting	<ul style="list-style-type: none"> Weekly reports will be completed onsite for the duration of construction activity and will incorporate any identification of ASS GPC will keep a register of ASS monitoring results and maintain the records in accordance with Section 6.16 of this Dredging EMP All records and associated permits will be provided to the relevant authority as required, upon request and/or at the completion of construction activities All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this Dredging EMP.
Corrective action/s	<ul style="list-style-type: none"> In the event of an incident relating to the potential release of acid leachate, runoff or sediment occurring: <ul style="list-style-type: none"> The GPC Environment Manager should be notified as soon as practicable as per Section 6.14 of this Dredging EMP The area will be identified and hydraulically isolated using suitable mitigation measures The runoff/sediment is to be treated with an adequate quantity of fine agricultural lime and samples analysed for pH prior to release An investigation into the cause of the incident will be conducted, and a review of the mitigation measures be initiated.
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.

9.2 Air quality management plan

Air quality impacts may be generated by emissions from dredging vessels during the act of dredging and during the placement of dredged material within the WB and WBE reclamation areas. Air quality and emissions management associated with the Project is described below.

All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> Prevent air quality impacts at nearby sensitive receptors Compliance with approval conditions and this Dredging EMP.
Potential impacts	<ul style="list-style-type: none"> Increased concentrations of dust, NO_x, SO₂ and CO in the surrounding environment of the dredging operations and the WBE reclamation area. The release of toxic, noxious or offensive odours, airborne contaminants and particulate matter resulting from the works may cause an environmental nuisance sensitive place. Unmitigated energy consumption and greenhouse gas (GHG) emissions.



Actions	<ul style="list-style-type: none"> • Watering of haul roads for the haulage of material within the WBRA • Watering to ensure material being dozed or graded is damp or applying suppressants to reduce emissions from completed sections of the reclamation area • Speed limits will be enforced to minimise dust generation • Vehicle movement will be restricted to designated roads and tracks, wherever practicable • Develop key performance indicators for fuel usage and efficiency • Maximising fuel efficiency and maximising payload through the following: <ul style="list-style-type: none"> – Match vessel capacity to application – Avoid water trapped in the dredged material hopper – Minimise non-payload weight, including spare parts and bunker fuel volumes – Logistics planning to optimise the number of trips from the area to be dredged to the BUF – Minimise idle time. • Contractors to coordinate with GPC to implement the use of biofuels where practicable. • Vessels will be registered and in survey as required by Australian law and to the International Maritime Organisation (IMO) guidelines. • Dredging vessels, plant and equipment will comply with the requirements of this Dredging EMP (refer Section 8) • All equipment will be serviced and maintained according to requirements of the Dredging EMP (refer Section 6.9) • Key personnel will be provided mandatory training in the potential Project air quality impacts, sensitive receptors and mitigation measures to be implemented.
Performance indicators	<ul style="list-style-type: none"> • Comply with relevant air quality objectives at locations of sensitive receptors • No air quality related complaints • No noxious or offensive odours or fumes that impede works being completed safely and/or that causes environmental nuisance at a nuisance sensitive place • Development of key performance indicators for fuel usage, delegation of responsibilities for monitoring, measurement and reporting.
Monitoring	<ul style="list-style-type: none"> • Vessel log books are maintained by the contractor and are available for viewing by GPC • The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this Dredging EMP to assess the effectiveness of control strategies • Audits are conducted by GPC as per Section 6.11 of this Dredging EMP • Dust deposition monitoring will be conducted at locations of sensitive receptors • Additional air quality monitoring will be conducted as required, in response to air quality complaints
Reporting	<ul style="list-style-type: none"> • GPC will maintain records of all inspections in accordance with Section 6.16 of this Dredging EMP • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this Dredging EMP • All records required by this plan and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities.
Corrective action/s	<ul style="list-style-type: none"> • The contractor will schedule maintenance and/or corrective actions as required for equipment issues • In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence • GPC to review this Dredging EMP (refer Section 6.18 of this Dredging EMP).



Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.
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9.3 Fauna management plan

Dredging activities have the potential to directly impact marine fauna through physical contact with dredging equipment and also indirectly through changes to noise and vibrations levels, water quality and loss of habitat and food sources.

As a minimum, the controls below will be implemented to manage the potential risk to fauna. All dredging operations will follow the measures outlined in Sections 8 and 9 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> • Minimise indirect impacts to native terrestrial, intertidal and marine fauna (including conservation significant species) • Minimise direct impacts to fauna resulting from dredging and placement activities.
Potential impacts	<ul style="list-style-type: none"> • Potential vessel strike leading to injury or death • Injury and/or death as a result of ingestion or entanglement of waste materials and marine debris • Direct loss of habitat and food source as a result of seabed removal at areas to be dredged • Decline in water quality in marine areas through dredging activities disrupting behaviour • Generation of underwater noise from dredging plant leading to injury or impacting behaviour • Disturbance of fauna behaviour from lighting impacts.
Actions	<ul style="list-style-type: none"> • A marine fauna spotter will be present on all moving vessels larger than 7m in length, at all times and will conduct a pre-start search for marine fauna prior to the commencement of dredging, and will continue to spot for marine fauna throughout dredging activities (i.e. continual observations during dredging). All fauna observations will be recorded and reported, as per the relevant approval requirements. All fauna occurrences will be recorded and reported as described in Section 6.16 of this Dredging EMP. • Immediately prior to the commencement of dredging activities, a search for marine megafauna will be conducted by a suitably qualified and experienced marine fauna spotter • Dredging works will be stopped in the event that the marine fauna spotter (or operator) observes a marine turtle or marine mammal (e.g. dolphin, dugong or whale) within 50m of the operation. Dredging will not recommence until the animal(s) have moved beyond 50m or until 15 minutes has passed and the animal(s) have not been observed within 50m of the operations during that time. The vessel may move to another area and recommence work provided that the 50m separation distance is maintained. • Dredger heads to be fitted with fauna exclusion devices, including but not limited to, turtle deflectors. This equipment will be appropriately serviced and inspected throughout dredging • When the drag head is not in contact with the seabed, and the pumps are in operation, the pump speed will be reduced and the drag head water jets to be activated to minimise the risk of turtle capture



- The Project direct impact area will remain free of plastic shopping bags to reduce detrimental impacts to marine and migratory species that occur within the areas that have the potential to be impacted by the Project activities
 - All plastic and packaging will remain adequately secured, to reduce it escaping into coastal environments
 - Any additional disturbance to marine habitats, outside of the approved area of disturbance, will not be carried out without the necessary approval
 - Where practicable, lighting solutions will be implemented to reduce potential marine fauna attraction to the Project direct impact area, and to avoid potential habitat fragmentation and fauna disturbance
 - Where practicable, marine turtle friendly lighting should be implemented for Project activities to ensure that only amber LED aeroscreen lighting is used for lighting outside of Project vessel cabins, cabin portholes on all Project vessels to be blacked out at night to prevent light spill, and the use of shading, no light source within the area is directly visible from outside the Project vessel perimeter
 - Dredging vessels and equipment will include noise attenuation measures for all pumps, motors and noise generating sources on deck wherever practicable to reduce potential disturbance to native fauna
 - If an animal is injured during construction activities, works in the immediate area of the animal will cease immediately and will not recommence until rescue actions have been taken and a review of appropriate management actions is undertaken to ensure the risk of reoccurrence is minimised
 - Speed limits will be enforced for vessels to prevent injuries to marine fauna. Go slow areas will be established in shall areas, less than 5m in depth
 - Where night lighting is required (i.e. cannot be avoided), the lights will be directional to avoid light spill into adjacent marine, intertidal and terrestrial areas, and appropriate bulbs will be selected and used to reduce potential impacts on marine fauna (e.g. to avoid impacts on marine turtle orientation).
- A marine species emergency response/notification plan will be developed to allow for the rapid and effective handling (e.g. capture and release) of marine fauna in the event that an incident occurs within Project impact areas.
 - Where practicable, all vessels will be fitted with propeller guards to reduce potential impacts on marine fauna as a result of propeller strike.
 - Dredger heads will be fitted with fauna exclusion devices, including turtle deflectors. This equipment will be appropriately serviced and inspected prior to commencement of dredging activities to ensure it is in good working order.
 - All vessel operators will be made aware of the potential for native fauna species, including conservation significant species, to occur within the Project impact areas, prior to construction.
 - In the event of an incident or non-conformance, the GPC Environment Manager should be notified as soon as practicable as per Section 6.14 of this Dredging EMP
 - Contractors working with marine vessels will comply with all requirements of the Port Procedures and Information for Shipping – Port of Gladstone (DTMR 2012).



Performance indicators	<ul style="list-style-type: none"> • No fatalities or injuries to marine fauna and/or migratory birds, associated with dredging activities • No fauna related complaints or incidents associated with the dredging or placement works • Disturbance to marine habitat will be restricted to the minimum required to enable the safe operation of the Project, in accordance with the relevant approval conditions • Activities comply with the Dredging EMP to minimise impacts on water quality, associated with the health of marine fauna and associated habitat • No avoidable environmental harm is caused within areas that have the potential to be impacted by dredging activities • No dredging related exceedances of relevant turbidity and benthic photosynthetic active radiation (BPAR) triggers caused by dredging activities (refer Appendix A) • Key personnel will be provided mandatory training in the potential Project fauna impacts, sensitive receptors and mitigation measures to be implemented.
Monitoring	<ul style="list-style-type: none"> • Marine fauna monitoring will be conducted on board all dredging vessels by the fauna spotter • GPC will monitor the condition of seagrass habitats in accordance with the Procedure.
Reporting	<ul style="list-style-type: none"> • GPC will keep a register of all monitoring results and maintain the records in accordance with Section 6.16 of this Dredging EMP • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP • Records of marine fauna encountered will be kept by the marine fauna spotters, indicating the sighting of each animal and action/s taken • A Fauna Incident Register will be maintained to log any injury or death of native fauna during Project activities • Records/logs of dredging and dredged material placement will be kept in accordance with Section 6.16 of this Dredging EMP • All records and associated permits will be provided to the relevant authority as required, upon request and/or at the completion of construction activities.
Corrective action/s	<ul style="list-style-type: none"> • If marine fauna habitat is incorrectly removed/disturbed, the contractor will contact the GPC Environment Manager immediately to advise of the breach. The Environment Manager will coordinate with the relevant authority to confirm measures to be implemented to address the non-conformance • In the event that fauna exclusion devices are removed or damaged in a way that could decrease their effectiveness, the contractor will contact the GPC Environment Manager and dredging will cease until devices are replaced/repared • Death or injury to megafauna will be reported as an incident, and will be reported immediately, in accordance with the relevant incident response procedures and Project approval requirements • In the event that a marine fauna species becomes stranded within an area that has the potential to be impacted by Project activities, the GPC Environment Manager will be notified as soon as is practicable. Construction personnel will avoid contact with the stranded species. The contractor will make a record of: <ul style="list-style-type: none"> – The precise location of animal – The legislated conservation status of the animal (if known) – The species type.



	<ul style="list-style-type: none"> • If the animal is alive, the GPC Environment Manager will contact the Marine Stranding Hotline (1300 130 372) and details of the animal will be provided. Construction activities within the immediate vicinity and any additional activities which have the potential to cause stress to the animal will cease until Queensland Parks and Wildlife Service (QPWS) staff can remove the animal • If the animal is dead, the GPC Environment Manager will contact the Marine Stranding Hotline (1300 130 372), and details of the animal will be provided. Liaison with QPWS will occur to ensure the animal's remains are retrieved • In the case where a crocodile is identified within the Project direct impact area, the GPC Environment Manager will contact the Marine Stranding Hotline (1300 130 372). Under no circumstances will personnel approach the animal, whether it has been determined to be dead or alive • In the event of injury or mortality to native fauna, other than conservation significant species: <ul style="list-style-type: none"> – The CEnvO must be contacted immediately to capture or organise the possible capture of the animal for transportation to a specialist veterinarian or wildlife carer. The animal must only be handled by a person suitably qualified to do so. The location of the injured animal will be identified/marked so it can be found again – The species of animal will be identified, if possible, and its approximate size determined – The type of injury sustained will be identified, if possible (without handling or causing the animal further stress). • In the event that injury or mortality to a conservation significant species occurs as a result of Project activities, the Project will proceed as per the High Risk Species Management Plan (for applicable species). For conservation significant species not addressed in the High Risk Species Management Plan, Project activities will cease until the relevant authority is consulted and advice implemented • GPC to review this this Dredging EMP as per Section 6.18 of this Dredging EMP.
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.

9.4 Vegetation management plan

Dredging has the potential to directly and indirectly impact on terrestrial and marine flora species and communities, through increased turbidity and sedimentation caused by the dredging and also by changes to water flows and sedimentation rates in intertidal area.

As a minimum, the controls below will be implemented to manage the potential risk to flora in the vicinity of the Project. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> • Minimise indirect impacts to native terrestrial, intertidal and marine flora (including conservation significant species and communities), and reduce direct impacts to the extent necessary to enable the safe operation of the Project
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Potential impacts	<ul style="list-style-type: none"> • Increased turbidity and decreased light availability for photosynthetic processes for marine plants • Increased sedimentation or erosion of intertidal areas • Changes to water quality resulting in increased levels of contaminants, adversely impacting marine flora • Impacts to seagrass, coral or sensitive habitats from dredging activities.
Actions	<ul style="list-style-type: none"> • Compliance with applicable Commonwealth, State and local vegetation management and marine plant management or legislative requirements • Dredging and dredged material placement works will be restricted to the extent necessary to enable the safe operation of the Project, including minimising the disturbance to ecologically sensitive areas (i.e. adjacent habitats and seagrass communities) • Any additional disturbance to marine habitats, outside of the approved area of disturbance, will not be carried out without the necessary approvals • Dredging operations will be carried out in accordance with Section 8 of this Dredging EMP to reduce impacts to marine flora • Key personnel will be provided mandatory training in the potential Project flora impacts, sensitive receptors and mitigation measures to be implemented
Performance indicators	<ul style="list-style-type: none"> • All necessary marine vegetation clearing permits and approvals are obtained prior to commencement of dredging; • No works undertaken outside of the Project direct impact area • No avoidable environmental harm is caused to native marine vegetation, within areas that have the potential to be impacted by Project activities, during the dredging phase • No dredging related exceedances of relevant turbidity and BPAR triggers caused by dredging activities. These triggers are outlined the Procedure. • An appropriate response is implemented where monitoring determines that the marine vegetation health is found to be compromised by dredging activities.
Monitoring	<ul style="list-style-type: none"> • Monitor the condition of seagrass habitats in accordance with the Procedure • Monitoring will be conducted to assess the effectiveness of control strategies. Turbidity and BPAR will be monitored in accordance with this Dredging EMP and the Procedure • Monitoring results will be provided to DoEE and DES as per permit requirements
Reporting	<ul style="list-style-type: none"> • Internal audits will be conducted every 3 months, and external third party audits will be conducted annually for the duration of the dredging, to ensure that: <ul style="list-style-type: none"> – Mitigation measures are being implemented effectively – Relevant performance criteria is being achieved – Activities are compliant with regulatory and project-specific requirements. • Turbidity minimising equipment will be serviced and inspected appropriately, and vessel log books will be maintained and available for viewing by relevant authorities • Records/logs of dredging and dredged material placement activities will be maintained in accordance with Section 6.16 of this Dredging EMP, relevant permit and legislative requirements • All complaints or incidents that are received by the contractor should be reported to the GPC Environment Manager as outlined in Section 6.14 of this this Dredging EMP • All records and associated permits will be provided to the relevant authority upon request and/or at the completion of construction activities as outlined in Section 6.16 of this Dredging EMP.



Corrective action/s	<ul style="list-style-type: none"> • If an area of marine vegetation is incorrectly dredged, the contractor will contact the GPC Environment Manager as soon as is practicable. The Environment Manager will notify the relevant authorities immediately, to advise them of the breach and to confirm measures to be implemented to address the non-conformance • Issues impeding the effectiveness of turbidity minimising equipment on the dredger, will be reported to the GPC Environment Manager immediately, to prevent possible impact to marine plant health • All other non-conformances will be corrected and reported to the GPC Environment Manager in accordance with Section 6.14 of this Dredging EMP • The cause of the incident will be investigated, and mitigation measures will be revised, if required, to prevent a re-occurrence • A review and adjustment to the dredging program to manage turbidity and light levels will be conducted in accordance with management triggers within the Procedure • GPC to review this this Dredging EMP as per Section 6.18 of this Dredging EMP.
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.

9.5 Pest and weed management plan

Marine pests and weed species have the potential to adversely affect the biodiversity values of the Port of Gladstone. Biosecurity Queensland is responsible for managing known marine pests in Queensland and GPC has obligations and responsibilities to Biosecurity Queensland under the *Biosecurity Act 2014* (Qld). The Department of Agriculture and Water Resources (DAWR) administer the *Biosecurity Act 2015* (Cth), which deals with new pest incursions, and places obligations and responsibilities on operators within the Port of Gladstone.

As a minimum, the controls below will be implemented to prevent or minimise biosecurity impacts of pest and weed incursion in the Port. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> • Adhere to the relevant statutory provisions regarding pest and weed management, in particular, the <i>Biosecurity Act 2014</i> and other biosecurity obligations relating to land management • Minimise the potential for environmental harm caused by the proliferation of invasive species (i.e. pests, weeds, and invasive ants), particularly those that are classified as prohibited matter, or restricted matter, under the provisions of the <i>Biosecurity Act 2014</i> • Adhere to the applicable Australian and other recognised Standards, Codes of Practice, and pest strategies including (but not limited to): <ul style="list-style-type: none"> – <i>Australian Weeds Strategy</i> (Natural Resource Management Ministerial Council 2007) – <i>Queensland Weed Spread Prevention Strategy</i> (Department of Primary Industries and Fisheries 2008) – DAWR Guidelines – <i>Australian Marine Pest Monitoring Guidelines</i> (Department of Agriculture Fisheries and Forestry 2010) – National System for the Prevention and Management of Marine Pest Incursions.
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Potential impacts	<ul style="list-style-type: none"> Increased competition, predation or disease, adversely impacting existing flora and fauna within the Port of Gladstone and the vicinity of the Project.
Actions	<ul style="list-style-type: none"> Compliance with applicable Commonwealth, State and local biosecurity requirements All marine vessels will be inspected for marine pests and weeds, by an appropriately skilled person, prior to entering the Project impact area The dredging contractor will prepare a Ballast Water Management Plan (BWMP) in accordance the Australian Ballast Water Management Requirements (most recent revision) including: <ul style="list-style-type: none"> Information on instances where immediate notification is required, Ballast water management measures Corrective actions (i.e. immediate investigation strategies, holding the balance of ballast on board, transferring the balance between tanks, examining ship to shore transfer options, etc.) Reporting/liaison requirements. All dredging plant will be required to conform with the BWMP and DAWR Guidelines to minimise the risk of the introduction of any introduced marine species. Throughout the dredging activity, dredging equipment will conform to DAWR Guideline and the BWMP s to minimise the risk of the introduction of any marine weed species Major incidents resulting in a significant spread of weeds and/or pests will be reported to the GPC Environment Manager. The GPC Environment Manager will then take appropriate action including contacting the relevant regulatory agency Key personnel will be provided mandatory training in the potential Project pest and weed impacts and mitigation measures to be implemented.
Performance indicators	<ul style="list-style-type: none"> No environmental harm is caused by introduction or proliferation of marine pest and/or weed species within areas that have the potential to be impacted by Project activities, during the dredging activities An appropriate response is implemented in the event that a marine pest/weed incursion is detected.
Monitoring	<ul style="list-style-type: none"> The areas that have the potential to be impacted by Project activities will be monitored frequently, in order to detect pest and weed species. Monitoring will be conducted in accordance with the Australian Marine Pest Monitoring Manual (National System 2010), including program design, frequency and review. Monitoring/inspections will ensure that all required measures are being implemented to prevent the introduction/proliferation of pests and weeds within areas that have the potential to be impacted by Project activities During dredging activities, information regarding the spread of weeds and/or pests within areas that have the potential to be impacted by Project activities will be incorporated into the weekly environmental report and toolbox presentations, as required Major incidents resulting in a significant spread of weeds and/or pests will be reported to the GPC Environment Manager, and the appropriate regulatory agency (e.g. DAWR, DES, MSQ) Where a Category 1 restricted matter is detected, Biosecurity Queensland will be contacted within 24 hours of its detection Gladstone Regional Council will be notified where a Category 2 restricted matter is detected, enabling them the opportunity to investigate the matter, and respond as per their Biosecurity Plan, if required.



Reporting	<ul style="list-style-type: none"> All complaints or incidents that are received by the contractor should be reported to the GPC Environment Manager as outlined in Section 6.14 of this Dredging EMP All records and associated permits will be provided to the relevant authority upon request and/or at the completion of dredging activities.
Corrective action/s	<ul style="list-style-type: none"> In the event that pest or weed infestations are detected the actions below will be implemented: <ul style="list-style-type: none"> Liaison and collaboration with DAWR, Biosecurity Queensland and Gladstone Regional Council will occur, where required, to identify and implement appropriate actions to the pest/weed infestation An appropriate weed and/or pest management strategy will be used/implemented to treat the infestation Continual monitoring of the infested area will occur until the infestation is controlled The cause of the pest and/or weed introduction/proliferation will be investigated, and mitigation measures will be revised, if required, to prevent a re-occurrence GPC to review this Dredging EMP as per Section 6.18.
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.

9.6 Aboriginal cultural heritage

An Indigenous Land Use Agreement (ILUA) is in place between GPC and the Port Curtis Coral Coast native title claimant group (PCCC) and the state of Queensland. In addition to this ILUA a Cultural Heritage Protocol (the Protocol) was entered into by the ILUA parties on 23 March 2014, to ensure the protection and management of all Aboriginal cultural heritage in the ILUA Area in relation to all port related operations (proposed or undertaken).

In accordance with the Protocol surveys of the area were conducted as part of the EIS process in consultation with PCCC representatives. PCCC representatives highlighted the fact that the Project impact areas must be viewed in the context of the larger, surrounding area and the other known sites, including quarries and stone sources, artefact scatters and resource areas, which hold high levels of cultural significance. Concern was specifically voiced by participating PCCC representatives in relation to the potential for the Project to impact both on recorded and unrecorded ecological locations and archaeological sites that may exist within the confines of the Project impact areas.

As a minimum, the controls below will be implemented to manage the potential risk to Aboriginal cultural heritage in the vicinity of the Project. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> Ensure Aboriginal heritage items/areas are not impacted Compliance with relevant legislation, approval conditions, the Protocol and management plans.
Potential impacts	<ul style="list-style-type: none"> The Project has potential to impact on Aboriginal cultural heritage through impacts to the ecological functioning and the natural physical processes in the surrounding area.



Actions	<ul style="list-style-type: none"> • All works must remain within the approved footprint and seek to minimise all disturbance associated with the Project • Consultation should continue between GPC and the PCCC in order to achieve the objectives of the Protocol • Prior to commencement of dredging activities, GPC staff and contractors who will be engaged in works and who are likely to have contact with Aboriginal cultural heritage to participate in a cultural heritage induction session, jointly presented by GPC and a suitably qualified representative of the PCCC • Key personnel will be provided mandatory training in the potential Project cultural heritage impacts and mitigation measures to be implemented • Should an item or object of historical Aboriginal cultural heritage significance be found during Project activities GPC will implement the New Discoveries provision for incidental finds of Aboriginal cultural heritage found during Project activities provided in Section 10.2 of the Protocol, including the following: <ul style="list-style-type: none"> – All work at the location of the potential find should be ceased and the contractor will notify the GPC Environment Manager – GPC's Environmental Advisor will undertake appropriate actions and provide management recommendations to the contractor.
Performance indicators	<ul style="list-style-type: none"> • All works associated with the Project are conducted in accordance with the Protocol and within the Project footprint • No heritage complaints or incidents associated with the dredging or placement works.
Monitoring	<ul style="list-style-type: none"> • The Traditional Owner groups will be given the opportunity by the dredging contractor to monitor a component of the potential impacts of the Project marine activities.
Reporting	<ul style="list-style-type: none"> • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this Dredging EMP • All records required by this plan and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities.
Corrective action/s	<ul style="list-style-type: none"> • GPC to review this Dredging EMP as per Section 6.18 • In consultation with GPC, the contractor will identify cause of the incident or nuisance, and institute preventative actions to prevent a re-occurrence.
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.

9.7 Non-Aboriginal cultural heritage management plan

Dredging activities associated with the Project have the potential to directly and indirectly impact on items of non-Aboriginal cultural heritage within the vicinity of the Project. The Great Barrier Reef is a listed cultural heritage item that potentially may be impacted by the Project, however the area's heritage listing relates to the size and diversity of ecosystems, the heritage values of the Great Barrier Reef will be protected through other Project management measures which protect ecological values within the vicinity of the Project. Shipwrecks have been recorded in the vicinity of the Project. Dredging has the potential to impact upon unidentified shipwrecks and other items or areas of cultural heritage value.

As a minimum, the controls below will be implemented to manage the potential risk items of non-Aboriginal cultural heritage in the vicinity of the Project. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.



Objectives	<ul style="list-style-type: none"> • Ensure Indigenous and non-Aboriginal cultural heritage items/areas are not impacted • Compliance with relevant legislation, approval conditions and management plans.
Potential impacts	Potential impacts to these items include damage to the physical fabric of a site/place and, effects of increased light and/or noise on an area of cultural heritage value.
Actions	<ul style="list-style-type: none"> • Known shipwreck locations to be avoided by Project activities • Prior to dredging activities commencing, undertake a thorough survey (e.g. remote sensing survey using multi-beam or side beam scanning sonar with magnetometer) of the area to be dredged and engage a suitably qualified and experienced maritime archaeologist to interpret the resultant data to identify any potential shipwrecks for further investigation and management • Ensure that all employees are suitably trained to identify cultural heritage sites or objects and report the finds to the CEnvO and maintain a log of all employees who have undergone cultural heritage training • Inform all employees of their obligations to notify the CEnvO of any cultural finds • Develop an accidental cultural heritage discovery reporting process and form that includes a clear chain of custody in the report (e.g. details of the person/s who made the discovery, date of discovery, description of discovery, location of discovery, etc.). The reporting process is to include roles and responsibility regarding the handling and reporting of cultural heritage discoveries. • Consider engaging an independent archaeologist for advice upon making a cultural heritage discovery • Should an item or object of historical non-Aboriginal cultural heritage significance be found during Project activities the following measures will be adopted: <ul style="list-style-type: none"> – All work at the location of the potential find must cease and the CEnvO will be notified – The CEnvO will notify GPC's Environmental Manager, who will undertake appropriate actions and provide management recommendations to the CEnvO. • GPC's Environmental Manager will notify the DES of any relevant finds in accordance with Section 89 of the <i>Queensland Heritage Act 1992</i>.
Performance indicators	<ul style="list-style-type: none"> • No heritage complaints or incidents associated with the dredging placement works • No works conducted outside approved bounds.
Monitoring	<ul style="list-style-type: none"> • Monitoring of cultural heritage will be managed through the actions outlined above and reporting requirements should an item of cultural heritage be found during the Project.
Reporting	<ul style="list-style-type: none"> • All complaints or incidents that are received by the contractor should be reported to the GPC Environment Manager as outlined in Section 6.14 of this this Dredging EMP • All records and associated permits will be provided to the relevant authority upon request and/or at the completion of construction activities.
Corrective action/s	<ul style="list-style-type: none"> • GPC to review this this Dredging EMP as per Section 6.18 • In consultation with GPC, the contractor will identify cause of the incident or nuisance, and institute preventative actions to prevent a re-occurrence.
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.



9.8 Noise and vibration management plan

Project dredging activities include the use of powered equipment operating at variable hours throughout the course of the dredging campaign. This has the potential to create noise and vibration impacts on the surrounding environment, including terrestrial noise and vibration impacts and underwater noise impacts.

Underwater noise impacts of dredging operations are not expected to result in significant adverse impacts due to the relatively low noise emissions from these activities and existing background noise levels.

As a minimum, the controls below will be implemented to manage potential noise and vibration impacts. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

Objectives	<ul style="list-style-type: none"> To prevent adverse terrestrial and underwater noise impacts at sensitive receptors. Compliance with conditions of approval and this Dredging EMP.
Potential impacts	<ul style="list-style-type: none"> Noise from operation of dredging equipment creating environmental nuisance or exceedance of background noise levels Behavioural and physiological impacts to marine fauna in response to underwater noise.
Actions	<ul style="list-style-type: none"> Dredging vessels and equipment will include noise attenuation measures for all pumps, motors and noise generating sources on deck wherever practicable Utilise on deck structures to screen noise emissions Dredging vessels, plant and equipment will comply with the requirements of this Dredging EMP (refer to Section 8) Key personnel will be provided mandatory training in the potential Project noise and vibration impacts, sensitive receptors and mitigation measures to be implemented
Performance indicators	<ul style="list-style-type: none"> No noise complaints or related incidents associated with the dredging works No exceedances of EPP (Noise) criteria.
Monitoring	<ul style="list-style-type: none"> All noise generated during the Project is to be monitored, documented and managed in accordance with the Noise and Vibration Management Plan (NVMP) that has been prepared as part of the Project EMP. The NVMP requires the following actions: <ul style="list-style-type: none"> Monitor construction noise levels at the commencement of the construction phase to verify the outcomes of the noise assessment and confirm the noise from the Project activities will not cause unacceptable impacts at sensitive receptors Implement a rolling spot check regime of noise intensive plants and equipment Undertaken all monitoring in accordance with relevant Australian Standards and regulatory guidelines for the measurement of environmental noise Conduct supplementary noise and/or vibration monitoring, as warranted, to identify issues of concern in response to any noise complaints. Noise monitoring will be conducted by GPC at nearby sensitive receptors in response to complaints received or reported incidents Vessel log books are maintained by the contractor and are available for viewing by GPC Spot checks of noise intensive plant and equipment by GPC as per Section 6.11 of this Dredging EMP Where practical, plan and manage the dredging program to utilise the less sensitive daytime and evening periods when dredging adjacent to residents on Facing Island Audits are conducted by GPC as per Section 6.11 of this Dredging EMP.



Reporting	<ul style="list-style-type: none"> • GPC will maintain records of all inspections in accordance with Section 6.16 of this Dredging EMP • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this Dredging EMP. • All records required by this plan and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities.
Corrective action/s	<ul style="list-style-type: none"> • The contractor will schedule maintenance and/or corrective actions as required for equipment issues • In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence • GPC to review this this Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.

9.9 Waste management plan

The generation of wastes during the Project is expected to be minimal on the basis that dredged material will be beneficially reused within the WBE reclamation area, with part of this area becoming additional port land and berths. Therefore, Project dredged material is not considered a waste.

The waste expected to be produced by the dredging associated with the Project includes municipal, quarantine waste, sewage/greywater as well as waste fuel, oils and lubricants.

Potential impacts associated with waste management can be avoided or minimised within the Project direct and potential indirect impact areas through implementation of appropriate mitigation measures. Such measures will aim to:

- Minimise the amount of waste generated by the Project
- Ensure no waste is released into the environment
- Ensure best practice management is adopted for the handling and storage of all waste materials
- Manage wastes and spills to prevent environmental harm
- Compliance with permit conditions, regulations and management plans.

As a minimum, the controls below will be implemented to manage potential risk of pollution of the environment from waste generated by the Project. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

9.9.1. Hydrocarbons including chemicals, fuels and oil

Objectives	<ul style="list-style-type: none"> • Ensure all hydrocarbon waste and hydrocarbon contaminated material is appropriately managed and disposed.
Potential impacts	<ul style="list-style-type: none"> • Contamination of soil and sediment through leaching • Contamination of water • Toxicity to marine and/or intertidal flora and fauna • Odour.



Actions	<ul style="list-style-type: none"> • All waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste • Incompatible wastes must not be mixed in the same container or waste storage area • Collection and disposal of waste material will be conducted by a licenced contractor, and disposed of at a licenced waste disposal facility, using appropriate tracking documentation • Regulated wastes will be contained and controlled in a manner that prevents environmental harm, and will be collected by a licenced contractor • Waste produced by dredging and other vessels will be managed via contractual arrangements with GPC, and will meet requirements of the GPC EMS as well as the relevant waste management legislation and guidelines. • Any waste fuel, oils and lubricants (including oily bilge water) generated by vessels during dredging works will be collected and managed by Nationwide Oil Pty Ltd as per DTMR's Port Procedures. • Waste water generated by the dredger activities will be stored on the dredger, transferred to Auckland Point Wharf area (or other Port wharf centre) for collection and then transported to GRC sewage treatment plant. Dredgers with on-board tertiary waste water treatment facilities will treat generated waste water within these facilities. • Absorbent material used to clean up hydrocarbon spills will be stored in an appropriate container marked 'regulated waste' • Waste management services provided by a licenced waste removal contractor will be utilised for the collection of tank washing slops, oily bilge water, and oily mixtures containing chemicals, oil sludge, and sewerage • Waste bulk oils will be stored on dredgers and directly transferred to existing Port wharves or via work boats • Temporary storage of hydrocarbons will occur in bunded areas that are appropriately sized for the application and capacity maintained (i.e. kept free of rain water) • Wash bilges with biodegradable degreasers or detergents and dispose of cleaning residue ashore • Use absorbents to mop up excess oil or fuel • Undertake checks and preventative maintenance of plant and equipment to minimise leaks and spills
Actions	<ul style="list-style-type: none"> • In the event of an oil or fuel spill into marine and/or terrestrial environments, vessels will adhere to the requirements of the spill-clean procedure included in the DTMR Guide for the prevention of ship-sourced pollution and for the safe transfer of bunkers in Queensland waters, 2016. An Environmental Incident Report and Corrective Action Report will be completed within 24 hours of the incident occurring as per the requirements set out in the Project EMP. • Spill response procedures implemented and staff are suitably trained • Spill equipment is available and staff are familiar with its use • Regular maintenance of work areas, storage areas, transfer equipment and spill equipment • All vessels arriving at the Port of Gladstone are required to follow the DTMR's Port Procedures and Information for Shipping, Port of Gladstone, 2017, which details quarantine requirements. • Upon arrival within the Port of Gladstone, all wastes, including quarantine waste, from the dredging vessels will be assembled for collection and disposal. Quarantine waste will



	<p>be kept in sealed plastic bags on board until collection by a licenced contractor (DTMR 2018). Quarantined waste will be sterilised prior to disposal at a licenced facility.</p> <ul style="list-style-type: none"> • In the event of a spill or non-conformance, the contractor will notify the GPC Environment Manager or Port Infrastructure Manager as soon as practicable • Operations will cease immediately if a waste management incident occurs that may be aggravated by continued construction operations • Call emergency services to assist with hazardous material spills. • Implement hydrocarbons, oils and other lubricants (including oily bilge) waste management measure, including: <ul style="list-style-type: none"> • Removal of solid and liquid waste to a licenced facility • Waste bulk oils will be stored on dredgers and directly transferred to existing Port wharves or via work boats • No truck and vehicle maintenance permitted at the reclamation area. All maintenance to occur offsite at either the quarry, GPC or contractor facilities • Powered Mobile Equipment (PME) will be suitable and rated for the task and kept in good working order • A PME preventative maintenance regime will be implemented • Temporary storage of hydrocarbons will occur in bunded areas that are appropriately sized for the application and capacity maintained (i.e. kept free of rain water) • Wash bilges with biodegradable degreasers or detergents and dispose of cleaning residue ashore • Use absorbents to mop up excess oil or fuel • Undertake checks and preventative maintenance of plant and equipment to minimise leaks and spills • Spill response procedures implemented and staff are suitably trained • Spill equipment (including hydrocarbon absorbent booms) is available and staff are familiar with its use • Regular maintenance of work areas, storage areas, transfer equipment and spill equipment • Call emergency services to assist with hazardous material spills • Appropriate handling of absorbent material (including absorbent booms) where these have been used to clean up spills.
Performance indicators	<ul style="list-style-type: none"> • No incidents or complaints will be received regarding waste generated by the Project causing environmental harm or nuisance • Ecological integrity of the surrounding environments will be maintained • All waste materials will be handled and stored in a safe and appropriate manner • There is no environmental impact on, and disturbance to, the adjoining terrestrial and/or marine areas from waste • Correct storage, transport and disposal of waste products, including tracking for regulated wastes.
Monitoring	<ul style="list-style-type: none"> • The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this Dredging EMP to assess the effectiveness of control strategies • Audits conducted by GPC as per Section 6.11 of this Dredging EMP.



Reporting	<ul style="list-style-type: none"> Records must be kept by the contractor when regulated waste is removed from site as per Section 6.16 of this Dredging EMP In the event of a waste management incident, an Environmental Incident Report and Corrective Action Report will be compiled, and forwarded on to the relevant authority All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP All records required by this Dredging EMP and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities. GPC may be requested to provide the contractor's waste tracking certificates to DES.
Corrective action/s	<ul style="list-style-type: none"> In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence The contractor must dispose of contaminants (including clean up material) from hydrocarbon and hazardous chemical spills as Regulated wastes GPC to review this Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.

9.9.2. Sewage/greywater

Objectives	<ul style="list-style-type: none"> Ensure all sewage waste associated with the dredging operation is appropriately managed and disposed of.
Potential impacts	<ul style="list-style-type: none"> Contamination of soil and sediments through leaching Odours Public health risks Contamination of water.
Actions	<ul style="list-style-type: none"> Waste water from dredger and ablution facilities to be collected then transported to Gladstone Regional Council sewage treatment plant Dredgers with tertiary treatment facilities will treat generated waste water on board Spill response procedures implemented and staff are suitably trained Spill equipment is available and staff are familiar with its use Regular maintenance of work areas, storage areas, transfer equipment and spill equipment In the event of a spill or non-conformance, the contractor should notify the GPC Environment Manager or Port Infrastructure Manager as soon as practicable Operations will cease immediately if a waste management incident occurs that may be aggravated by continued construction operations Call emergency services to assist with hazardous material spills.
Performance indicators	<ul style="list-style-type: none"> No incidents or complaints will be received regarding waste generated by the Project causing environmental harm or nuisance Ecological integrity of the surrounding environments will be maintained All waste materials will be handled and stored in a safe and appropriate manner There is no environmental impact on, and disturbance to, the adjoining terrestrial and/or marine areas from waste Correct storage, transport and disposal of waste products including tracking for regulated wastes.



Monitoring	<ul style="list-style-type: none"> The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this Dredging EMP to assess the effectiveness of control strategies Audits conducted by GPC as per Section 6.11 of this Dredging EMP.
Reporting	<ul style="list-style-type: none"> Records must be kept by the contractor when regulated waste is removed from site as per Section 6.16 of this Dredging EMP In the event of a waste management incident, an Environmental Incident Report and Corrective Action Report will be compiled, and forwarded on to the relevant authority All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP All records required by this Dredging EMP and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities. GPC may be requested to provide the contractor's waste tracking certificates to DES.
Corrective action/s	<ul style="list-style-type: none"> In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence The contractor must dispose of contaminants (including clean up material) from hydrocarbon and hazardous chemical spills as regulated wastes GPC to review this Dredging EMP as per Section 6.18.
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.

9.9.3. Hazardous and potentially hazardous waste

Objectives	<ul style="list-style-type: none"> Ensure all hazardous waste associated with the dredging operation is appropriately managed and disposed of.
Potential impacts	<ul style="list-style-type: none"> Public health risks Contamination of soil and sediments through leaching Toxicity to marine and/or intertidal flora and fauna Contamination of water.
Actions	<ul style="list-style-type: none"> Maintain inventory and safety data sheets for hazardous substances Tracking records to be kept when regulated waste is removed from the dredger or a GPC wharf facility. All regulated waste transported by licenced contractors and disposed at a licenced place Bring only the minimum quantity of substance required Store full and empty drums and/or containers in bunded areas Collect empty drums for re-use or recycling Waste not disposed of by burning Hazardous substances handled and stored in a manner that prevents environmental harm In the event of a spill or non-conformance, the contractor should notify the GPC Environment Manager or Port Infrastructure Manager as soon as practicable Operations will cease immediately if a waste management incident occurs that may be aggravated by continued construction operations Call emergency services to assist with hazardous material spills.



Performance indicators	<ul style="list-style-type: none"> No incidents or complaints will be received regarding waste generated by the Project causing environmental harm or nuisance Ecological integrity of the surrounding environments will be maintained All waste materials will be handled and stored in a safe and appropriate manner There is no environmental impact on, and disturbance to, the adjoining terrestrial and/or marine areas from waste Correct storage, transport and disposal of waste products, including tracking for regulated wastes.
Monitoring	<ul style="list-style-type: none"> The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this this Dredging EMP to assess the effectiveness of control strategies Audits conducted by GPC as per Section 6.11 of this Dredging EMP.
Reporting	<ul style="list-style-type: none"> Records must be kept by the contractor when regulated waste is removed from site as per Section 6.16 of this Dredging EMP In the event of a waste management incident, an Environmental Incident Report and Corrective Action Report will be compiled, and forwarded on to the relevant authority All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP All records required by this Dredging EMP and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities. GPC may be requested to provide the contractor's waste tracking certificates to DES.
Corrective action/s	<ul style="list-style-type: none"> In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence The contractor must dispose of contaminants (including clean up material) from hydrocarbon and hazardous chemical spills as Regulated wastes GPC to review Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.

9.9.4. Municipal waste

Objectives	<ul style="list-style-type: none"> Ensure all municipal waste associated with the dredging operation is appropriately managed and disposed of.
Potential impacts	<ul style="list-style-type: none"> Degradation of visual amenity Injury to terrestrial or marine animals.
Actions	<ul style="list-style-type: none"> Appropriate waste disposal facilities will be present on-board the vessel/s, and food scraps will be removed from the vessel/s daily Responsibilities will be assigned and communicated regularly (e.g. toolbox presentation, signage etc.) Appropriate provisions for waste segregation and storage on the dredger and at GPD wharf facilities will be established to maximise opportunities for reuse and recycling, in preference to disposal to landfill. Adequate storage capacity will be maintained and no waste remains uncontained No person will discard, dispose of, or leave rubbish, refuse, waste (including galley waste) wastewater, or other liquid waste from a vessel, unless it is done in a controlled manner, in an authorised and designated area, or through approved services



	<ul style="list-style-type: none"> • Ensure that waste is removed and disposed of by a licenced contractor on a regular basis to a licenced waste facility • Educate staff to recycle waste • Use sealed bins to prevent wind, animals and rain from spreading litter • Ensure that bins/bags used on the dredgers to store waste are secure • Retrieve litter that does enter the water • In the event of a spill or non-conformance, the contractor should notify the GPC Environment Manager or Port Infrastructure Manager as soon as practicable • Operations will cease immediately if a waste management incident occurs that may be aggravated by continued construction operations • Call emergency services to assist with hazardous material spills • Key personnel will be provided mandatory training in the potential Project waste impacts and mitigation measures to be implemented
Performance indicators	<ul style="list-style-type: none"> • No incidents or complaints will be received regarding waste generated by the Project causing environmental harm or nuisance • Ecological integrity of the surrounding environments will be maintained • All waste materials will be handled and stored in a safe and appropriate manner • There is no environmental impact on, and disturbance to, the adjoining terrestrial and/or marine areas from waste • Correct storage, transport and disposal of waste products including tracking for regulated wastes.
Monitoring	<ul style="list-style-type: none"> • The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this Dredging EMP to assess the effectiveness of control strategies • Audits conducted by GPC as per Section 6.11 of this Dredging EMP.
Reporting	<ul style="list-style-type: none"> • Records must be kept by the Contractor when waste is removed from site as per Section 6.16 of this Dredging EMP • In the event of a waste management incident, an Environmental Incident Report and Corrective Action Report will be compiled, and forwarded on to the relevant authority • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP • All records required by this Dredging EMP and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities. GPC may be requested to provide the contractor's waste tracking certificates to DES.
Corrective action/s	<ul style="list-style-type: none"> • In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence • The contractor must dispose of contaminants (including clean up material) from hydrocarbon and hazardous chemical spills as Regulated wastes • GPC to review this Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.



9.9.5. Quarantine waste

Objectives	<ul style="list-style-type: none"> Ensure all quarantine waste associated with the dredging operation is appropriately managed and disposed of.
Potential impacts	<ul style="list-style-type: none"> Introduction of foreign pest species (terrestrial or marine) Environmental, economic and community impacts.
Actions	<ul style="list-style-type: none"> To comply with requirements of MSQ "Port Procedures and Information for Shipping, Port of Gladstone" ships moored at berth must arrange for the appropriate collection and disposal of all wastes, quarantine or otherwise, unless exempt by the DAWR. Quarantine waste must be segregated (e.g. organic, general and recyclable wastes) then be kept in sealed plastic bags on board the vessel until collected Quarantine wastes are not to be disposed of at sea Record the movement and quantities of regulated and quarantine waste In the event of a spill or non-conformance, the contractor should notify the GPC Environment Manager or Port Infrastructure Manager as soon as practicable Operations will cease immediately if a waste management incident occurs that may be aggravated by continued construction operations Any spills to be cleaned up as soon as practicable.
Performance indicators	<ul style="list-style-type: none"> No incidents or complaints will be received regarding waste generated by the Project causing environmental harm or nuisance Ecological integrity of the surrounding environments will be maintained All waste materials will be handled and stored in a safe and appropriate manner There is no environmental impact on, and disturbance to, the adjoining terrestrial and/or marine areas from waste Correct storage, transport and disposal of waste products including tracking for regulated wastes.
Monitoring	<ul style="list-style-type: none"> The works areas and associated access areas may be inspected by GPC as per Section 6.11 of this Dredging EMP to assess the effectiveness of control strategies The number of complaints/incidents will be monitored by GPC Audits conducted by GPC as per Section 6.11 of this this Dredging EMP.
Reporting	<ul style="list-style-type: none"> Records must be kept by the contractor when regulated waste is removed from site as per Section 6.16 of this Dredging EMP In the event of a waste management incident, an Environmental Incident Report and Corrective Action Report will be compiled, and forwarded on to the relevant authority All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.14 of this this Dredging EMP All records required by this plan and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities. GPC may be requested to provide the contractor's waste tracking certificates to DES.
Corrective action/s	<ul style="list-style-type: none"> In consultation with GPC, the contractor will identify cause of any incident or nuisance, and institute preventative actions to prevent a re-occurrence The contractor must dispose of contaminants (including clean up material) from hydrocarbon and hazardous chemical spills as Regulated wastes GPC to review this Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> Port Infrastructure Asset Manager GPC Environment Manager Dredging contractor.



9.10 Water quality management plan

Dredging, dredged material placement and decant water discharge have the potential to impact on water quality in the Port of Gladstone, however appropriate management controls will be in place to ensure that these potential impacts do not affect sensitive receptors.

Activities associated with Project dredging have the potential to increase turbidity resulting in increased sedimentation and impacting on the amount of available light (BPAR) for seagrass. The licenced discharge of decant water from the dewatering of dredged material has the potential to impact on water quality in the vicinity of the WBE reclamation area, including potential impacts to water pH, turbidity and adjacent ecological communities.

As part of the EIS process for the Project, numerical models were used to simulate the physical processes and to assess the potential impacts of the dredging and dredged material placement activities. Based on the outcomes of these models and the known tolerances of seagrass and coral communities within Port Curtis, water quality zones of predicted impact have been established surrounding the Project impact areas (refer Appendix A).

Continuous real-time monitoring of turbidity and BPAR at locations throughout Port Curtis have been selected to monitor the impacts to sensitive receivers within the zones of impact of the Project (refer Appendix A).

Figure 9.1 provides a summary of the turbidity and BPAR monitoring and the real time adaptive management steps to ensure impacts to sensitive receivers, as a result of dredging related turbidity, are avoided, minimised or mitigated.

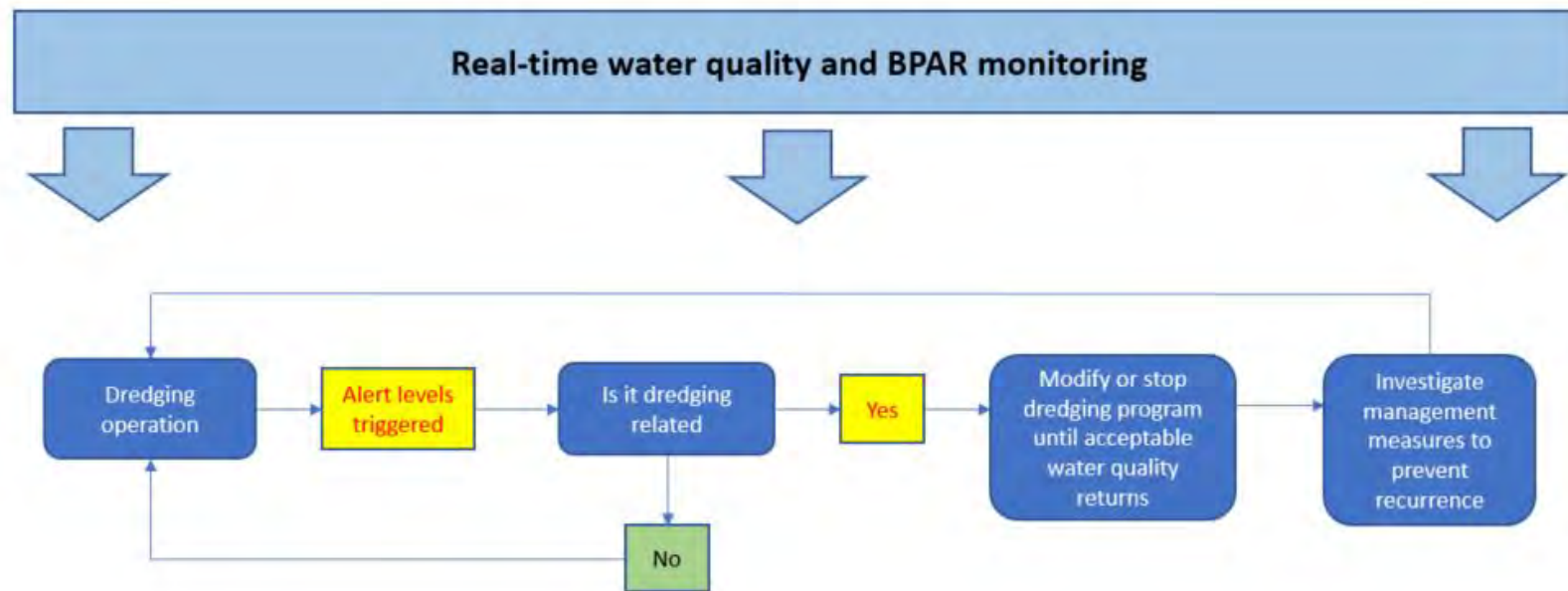


Figure 9.1 Continuous real-time water quality and BPAR monitoring management measures



As a minimum, the controls below will be implemented to manage the potential risk to water quality. In addition, management measures will be in accordance with monitoring strategies outlined in the Procedure. All dredging operations will follow the measures outlined in Section 8 of this Dredging EMP.

9.10.1. Decant water

Objectives	<ul style="list-style-type: none"> Limit sediment (turbid plume) mobilisation to an extent consistent with protecting the viability of ecological communities in the Port of Gladstone Limit the impact of dewatering operations on marine life and water quality to an extent consistent with protecting the viability of specified communities
Potential impacts	<p>Decant water that does not comply with the licenced water quality discharge limits prior to being discharged into the Port has the potential to adversely impact on the receiving environment in the vicinity of the Project, including impacts to:</p> <ul style="list-style-type: none"> Water quality Marine flora and fauna.
Actions	<ul style="list-style-type: none"> Decant water will be treated in decanting ponds constructed at the WB and WBE reclamation areas. All decant water will be treated to meet the water quality limits outlined in the ERA 16 approval and Project Environmental Monitoring Procedure prior to being released at the licensed discharge points. No decant water is to be discharged prior to water monitoring in accordance with the Project Environmental Monitoring Procedure and the ASSMP. If required, lime dosing of decant water within the WB and WBE reclamation areas in accordance with the ASSMP. In the event that discharge occurs, or is likely to occur, at other than the approved and monitored discharge point, dredging will stop Key personnel will be provided mandatory training in the potential Project water quality impacts, sensitive receptors and mitigation measures to be implemented.
Performance indicators	<ul style="list-style-type: none"> All decant water achieves the water quality levels outlined in the Procedure prior to discharge.
Monitoring	<p>As part of the Procedure GPC will implement a decant water monitoring program which will include the following:</p> <ul style="list-style-type: none"> Turbidity and pH monitoring of all waters within the WBE reclamation area polish pond Weekly laboratory testing of ammonia levels within the WBE reclamation area polish pond Monthly laboratory testing of heavy metals within the WBE reclamation area polish pond Groundwater monitoring following establishment of groundwater monitoring bores in accordance with the ASSMP Visual observations to check for scum formations, oil spills, etc Plume validation monitoring of turbidity in receiving waters adjacent to the discharge point.
Reporting	<ul style="list-style-type: none"> GPC will keep a register of results of water quality monitoring and other measures implemented, and maintain the records in accordance with Section 6.16 of this Dredging EMP GPC will report monitoring results to DoEE and DES as per approval requirements All complaints or incidents that are received by the dredging contractor will be reported to GPC. GPC will report these as per Section 6.14 of this Dredging EMP.



Corrective action/s	<ul style="list-style-type: none"> • In the event of a non-conformance with water quality trigger values, the GPC Environment Manager will be notified. The water may be subject to appropriate treatment and testing before any discharge. • In consultation with GPC, the dredging contractor will identify the cause of the incident or nuisance, and implement preventative actions to prevent a re-occurrence • GPC will review the dredging schedule in consultation with the dredging contractor to manage turbidity and light levels in the Port • GPC to review this Dredging EMP as per Section 6.18
Responsible person/s	<ul style="list-style-type: none"> • Port Infrastructure Asset Manager • GPC Environment Manager • Dredging contractor.

9.10.2. Dredging water quality

Objectives	<ul style="list-style-type: none"> • Limit sediment (turbid plume) mobilisation to an extent consistent with protecting the viability of ecological communities in the Port of Gladstone • Protect nearby sensitive receptors from excess turbidity • Achieve the water quality objectives outlined in the Procedure.
Potential impacts	<ul style="list-style-type: none"> • Increased turbidity, impacting on sedimentation in intertidal areas and ecological communities • Decreased availability of BPAR, impacting on ecological communities that depend on it, including seagrass communities occurring in the Port of Gladstone • Changes to water quality and water chemistry in the vicinity of the WBE reclamation area, potentially impacting on marine flora and fauna communities as well as intertidal ecological communities.
Actions	<ul style="list-style-type: none"> • Dredging vessels, plant and equipment will comply with the requirements of this Dredging EMP (refer to Section 8) • Where practical scheduling the timing of dredging to reduce the potential likelihood for turbid plumes to impact on sensitive receptors such as avoiding the late spring and early summer periods (together with other less extreme summer periods), which represent key periods for seagrass growth and resilience building • Dredging operations to be undertaken during suitable conditions (i.e. within the operational parameters of the dredger, for example not during high energy situations such as storm surges). If the BoM issues a severe weather warning, dredging works within the affected area to cease. • Dredger and work boats sailing routes to be optimised to reduce the generation of propeller wash • Ensure the dredger operates within approved dredging footprint at all times • The TSHD and barges will carry out adaptive management measures depending on results of water quality monitoring (i.e. reduce overflow, move location, etc.) • Overflow levels to be raised to the highest allowable point during sailing from the channel duplication area to be dredged to the BUF to ensure spillage of sediment is reduced



	<ul style="list-style-type: none"> • The barges to be fitted with 'green valves' in the overflow pipe to control the amount of air contained in the excess water in order to reduce turbidity. Overflow discharge to be managed using a computer-based management system to prevent excessive overflow discharge. • Below keel discharge of tailwaters to be via an anti-turbidity control valve. Vessel to have on-board systems for determining the density of dredged material (or solid to water ratio). • Turbidity minimising equipment will be serviced and inspected appropriately by the dredging contractor. Vessel log books will be maintained by the dredging contractor and are available for viewing by GPC. • Prepare and finalise a dredging contractors' Ballast Water Management Plan in accordance with the Australian Ballast Water Management Requirements (Version 6) (Commonwealth Government 2016). The management plan will include contingency measures that include, but are not limited to: <ul style="list-style-type: none"> – Immediate notification to DAF (Biosecurity Queensland), DAWR, DES and MSQ – Follow any directions or notices given by a regulator in relation to marine pests – Corrective actions (i.e. immediate investigation strategies, holding the balance of ballast on board, transferring the balance between tanks, examining ship to shore transfer options, etc.) – Consequential reporting/liaison requirements.
Performance indicators	<ul style="list-style-type: none"> • No dredging related exceedances of the trigger levels outlined in the Procedure • No incidents/complaints pertaining to water quality that are attributed to the activity • All contaminant spills cleaned up effectively.
Monitoring	<ul style="list-style-type: none"> • All water quality monitoring will be conducted by GPC in accordance with this Dredging EMP and the Procedure and includes the following monitoring parameters: <ul style="list-style-type: none"> – Physiochemistry: including pH, dissolved oxygen (DO), temperature and electrical conductivity – Nutrients – Turbidity (NTU) – BPAR – Metals (total and dissolved) – Organic contaminants. • GPC will monitor real time turbidity data at monitors installed at eight monitoring sites • Seagrass communities will also be monitored in accordance with the Procedure.
Reporting	<ul style="list-style-type: none"> • The contractor will keep records/logs of dredging and dredged material placement activities will be maintained in accordance with Section 6.16 of this Dredging EMP • GPC will maintain records of all inspections in accordance with Section 6.16 of this Dredging EMP • All complaints or incidents that are received by the contractor should be reported to GPC. GPC will report these as per Section 6.13 of this this Dredging EMP • All records required by this plan and associated permits must be provided by the contractor to GPC upon request and/or at the completion of dredging activities • Water quality monitoring data will be submitted by GPC to DoEE and DES following the Project dredging campaigns.



Corrective action/s	<ul style="list-style-type: none">• All non-conformances will be corrected and reported to the GPC Environment Manager in accordance with Section 6.14 of this Dredging EMP• The cause of the incident will be investigated, and mitigation measures will be revised, if required, to prevent a re-occurrence• A review and adjustment to the dredging program to manage turbidity and light levels will be conducted in accordance with management triggers within the Procedure• GPC to review this this Dredging EMP as per Section 6.18 of this Dredging EMP.
Responsible person/s	<ul style="list-style-type: none">• Port Infrastructure Asset Manager• GPC Environment Manager• Dredging contractor.

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10. More information

This Plan will be available to all employees, contractors and consultants to which it applies.

This document is uncontrolled when printed.

If you require any further information, please contact the document Facilitator, listed on the cover page.

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References

Commonwealth of Australia 2009, National Assessment Guidelines for Dredging 2009, Canberra, 2009.

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Appendix A - Project Environmental Monitoring Procedure

Refer to AEIS (Appendix H).

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Appendix B – Environmental values

Priority port master planning is a commitment in the *Reef 2050: Long Term Sustainability Plan* to ensure that the outstanding universal value (OUV) of the Great Barrier Reef World Heritage Area (GBRWHA) are an intrinsic consideration in the future port development, management and governance.

Table B-1 summarises the locally expressed (OUV) attributes within the Port of Gladstone and surrounding areas, and their contribution classifications relative to the overall OUV of the GBRWHA. Table B-1 also includes a summary of the environmental values determined to be key contributors to the local expression of the attributes of the OUV of the GBRWHA (i.e. key environmental values). Other environmental values are recognised as locally contributing to the overall OUV of the GBRWHA.

Section 6 and Section 9 of this Dredging EMP will be implemented in order to ensure that dredging associated with the Project does not negatively impact on the identified sensitive receptors, including matters of national environmental significance (MNES). Mapping of the key environmental values outlined in Table B-1 will be included in the Dredging EMP following Project EIS approval.

Table B-1 Matters of national environmental significance relevant to Port Curtis

Category	Local attribute	Relevant OUV criteria and contribution classifications ¹				Summary of the key environmental values
		vii ²	viii ³	ix ⁴	x ⁵	
Coral reefs	Fringing reefs	Min	Min	Min	Min	Fringing coral reefs
	Inshore turbid reefs	-	Min	Min	Min	Inshore turbid coral reefs
	Coral species diversity and extent	Min	Min	Min	Min	Various coral species
Marine water quality	Marine water quality	-	-	Mod	Mod	Marine water quality
Fish	Fish species and diversity	Min	-	Min	Min	Colosseum Inlet Fish Habitat Area Calliope River Fish Habitat Area Coral reefs, seagrass meadows, mangrove communities, hard and soft benthic substrates, beach habitats, estuaries, creeks and rivers
Marine megafauna	Dugong	-	-	-	Mod	Dugong species Seagrass meadows
	Species of whales	-	-	-	Min	Minke whales Sperm whales Humpback whales
	Migrating whales	Min	-	-	-	Humpback whales and calving habitat
	Species of dolphins	Min	-	-	Sig	Australian humpback dolphins
Marine turtles	Breeding colonies of marine turtles	Mod	-	-	Mod	Flatback turtle rookery on Curtis Island Nesting beaches on Facing, Curtis and Wild Cattle Islands, Boyne Island Beach and Tannum Sands
	Green turtle breeding	Min	-	-	Min	
	Marine turtle rookeries	Mod	-	-	Mod	
	Nesting turtles	Min	-	-	-	
Seagrass and macroalgae	Seagrass	Min	Min	Mod	Mod	Seagrass meadows
	Beds of <i>Halimeda</i> algae	-	-	Min	-	Beds of <i>Halimeda</i> algae



Category	Local attribute	Relevant OUV criteria and contribution classifications ¹				Summary of the key environmental values
		vii ²	viii ³	ix ⁴	x ⁵	
Shorebirds and migratory seabirds	Seabirds	Min	-	Min	Min	Potential foraging habitat
	Shorebirds and migratory birds	-	-	-	Sig	Threatened migratory shorebird species Shorebird habitat and important roost sites (note these vary from year to year)
Flora, fauna and ecological communities	Threatened and endangered flora and fauna species (including threatened ecological communities)	Min	-	-	Mod	Coastal Saltmarsh Threatened Ecological Community
	Vegetated mountains	Min	-	-	-	Mount Larcom landform
	Mangroves	Min	Min	Min	Min	Various mangrove species
	Mangrove species diversity	-	-	-	Min	Various mangrove species
	Vast mangrove forests	Mod	-	-	-	Mangrove sequences at The Narrows
Continental islands	Continental islands and green vegetated islands	Mod	Mod	-	-	Curtis Island
	Plant species diversity and endemism (species being unique to a defined geographic location)	-	-	-	Sig	Curtis Island
	Vegetation of the continental islands	-	-	Sig	Sig	Curtis Island
Geomorphology	Beaches	Min	-	-	-	Curtis Island beaches Facing Island beaches Boyne Island Beach
	Dune systems	Min	Min	-	-	Parabolic dunes Curtis Island
	River deltas	Min	Min	Min	Min	Marine tidal sand deltas (Curtis Island, Boyne River, Colosseum Inlet)
	Connectivity: cross-shelf, longshore and vertical	-	Min	Min	Min	The Narrows tidal passage
Cultural heritage values	Traditional Owner interaction with the natural environment	-	-	Mod	-	Indigenous cultural heritage sites and values
Marine fauna	Diversity supporting marine fauna species (global conservation significance)	Min	-	Min	Mod	A diverse range of marine fauna species
Total species diversity	Total species diversity	Mod	-	Mod	Mod	A diverse range of marine, intertidal and terrestrial flora and fauna species

Table notes:

- | | | |
|---|------|--|
| 1 | Min | Minor |
| | Mod | Moderate |
| | Sig | Significant |
| 2 | vii | Aesthetic values and superlative natural phenomena |
| 3 | viii | Ongoing geological processes |
| 4 | ix | Ecological and biological processes |
| 5 | x | Biodiversity conservation |



Appendix C – Matters of National Environmental Significance

A summary of the MNES located in areas with potential to be impacted by the Project is provided in Table C-1, including the relevant sections of the EPBC Act and where potential impacts are addressed in this Dredging EMP. The table outlines where controlling provisions under the EPBC Act are not relevant to the Project activities (e.g. nuclear actions).

Table C-1 Matters of national environmental significance and their relevance to the Project

MNES in relation to the Project	Summary of values/species present within the Project impact areas	Relevant figure reference
World Heritage properties (Sections 12 and 15A) and National Heritage places (Sections 15B and 15C)		
The areas to be dredged (including the channel duplication and barge access channel), location of new navigational aids, and the WBE reclamation area are situated within the boundaries of the Great Barrier Reef World Heritage Area which is both a World Heritage property and a National Heritage place (i.e. Project activities below the LAT within the Port are located within the GBRWHA)	The 2012 <i>Statement of Outstanding Universal Value for the Great Barrier Reef World Heritage Area</i> establishes that the GBRWHA meets all four natural heritage criteria of the current Operational Guidelines, all of which are considered to be present within the Port of Gladstone. These are:	Mapping of MNES will be included in the Dredging EMP following Project EIS approval.
	<ul style="list-style-type: none"> ■ Criterion vii – contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance 	
	<ul style="list-style-type: none"> ■ Criterion viii – be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features 	
	<ul style="list-style-type: none"> ■ Criterion ix – be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals 	
	<ul style="list-style-type: none"> • Criterion x – contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of OUV from the point of view of science or conservation 	
Wetlands of international importance (Ramsar wetlands) (Sections 16 and 17B)		
No Ramsar wetlands are located within close proximity to the Project impact areas. Shoalwater and Corio Bay Ramsar wetlands are located approximately 98km to the north of the WBE reclamation area	N/A	



MNES in relation to the Project	Summary of values/species present within the Project impact areas	Relevant figure reference
Nationally threatened species and ecological communities (Sections 18 and 18A)		
Subtropical and Temperate Coastal Saltmarsh Threatened Ecological Community	There will be no direct loss of this TEC as a result of the Project activities, however this TEC is located within the Project indirect impact areas as it is situated approximately 200 to 300 m from the WBE reclamation area	
No threatened flora species were identified during Project EIS field investigations and no species are known to occur within the direct impact areas as identified during previous and Project EIS studies	N/A	
Five marine turtle species are known to occur, or have moderate potential to occur, in the Port Curtis region	<ul style="list-style-type: none"> Flatback turtle (<i>Natator depressus</i>) – Vulnerable Green turtle (<i>Chelonia mydas</i>) – Vulnerable Loggerhead turtle (<i>Caretta caretta</i>) – Endangered Hawksbill turtle (<i>Eretmochelys imbricata</i>) – Vulnerable Olive Ridley turtle (<i>Lepidochelys olivacea</i>) – Endangered 	
Twenty species of marine megafauna are known to occur or predicted to occur in the Port Curtis region	<ul style="list-style-type: none"> Eight whales are known or predicted to occur in the Port Curtis region Ten dolphin species are known or predicted to occur in the Port Curtis region and in adjoining waterways Dugong are known from the Port Curtis region 	
Eight species of threatened migratory shorebirds are known from the Project area	<ul style="list-style-type: none"> Bar-tailed godwit (<i>Limosa lapponica baueri</i>) - Vulnerable Curlew sandpiper (<i>Calidris ferruginea</i>) – Critically endangered Eastern curlew (<i>Numenius madagascariensis</i>) – Critically endangered Great knot (<i>Calidris tenuirostris</i>) – Critically endangered Northern Siberian bar-tailed godwit (<i>Limosa lapponica menzbieri</i>) – Critically endangered Red knot (<i>Calidris canutus</i>) – Endangered Greater sand plover (<i>Charadrius leschenaultia</i>) – Vulnerable Lesser sand plover (<i>Charadrius mongolus</i>) – Endangered 	
Ten threatened pelagic bird species have a moderate potential to occur within the Project impact areas	<ul style="list-style-type: none"> Three species of petrel Seven species of albatross 	



MNES in relation to the Project	Summary of values/species present within the Project impact areas	Relevant figure reference
It is highly likely that habitat for three intertidal and terrestrial fauna species occurs within the Project impact areas	<ul style="list-style-type: none"> Coastal sheath-tail bat (<i>Taphozous australis</i>) Koala (<i>Phascolarctos cinereus</i>) – Vulnerable Water mouse (<i>Xeromys myoides</i>) – Vulnerable 	
Migratory species (Sections 20 and 20A)		
Eight migratory marine fish species are known from the Project impact areas	<ul style="list-style-type: none"> Five shark species Two manta ray species Green sawfish (<i>Pristis zijsron</i>) - Vulnerable 	
Six migratory reptiles are known to occur or have a moderate likelihood of occurring within the Project impact areas	<ul style="list-style-type: none"> Five marine turtles Estuarine crocodiles (<i>Crocodylus porosus</i>) 	
Ten migratory megafauna species are known or predicted to occur in the Project impact areas	<ul style="list-style-type: none"> Six migratory whales Three migratory dolphin species Dugong 	
Sixty migratory bird species are confirmed or have a moderate likelihood of occurring in the Project impact areas	<ul style="list-style-type: none"> Sixty migratory bird species are confirmed or have a moderate likelihood of occurrence within in the Project impact areas Including populations which have exceeded approximately 0.1% of the flyway population on at least one occasion for the following species: <ul style="list-style-type: none"> Eastern curlew (<i>Numenius madagascariensis</i>) Grey-tailed tattler (<i>Tringa brevipes</i>) Terek sandpiper (<i>Xenus cinereus</i>) Lesser sand plover (<i>Charadrius mongolus</i>) Ruddy turnstone (<i>Arenaria interpres</i>) 	



MNES in relation to the Project	Summary of values/species present within the Project impact areas	Relevant figure reference
Commonwealth marine areas (Sections 23 and 24A)		
Commonwealth marine areas include any part of the sea, including the waters, seabed and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia. Commonwealth marine areas stretch from 3 to 200 nautical miles from the coast The Project impact areas are not located within Commonwealth marine areas, with the nearest Commonwealth marine areas situated more than 9km from the area to be dredged and the new navigational aids	N/A	N/A
Great Barrier Reef Marine Park (Sections 24B and 24C)		
The GBRMP boundary is situated on the open coastal waters side of Curtis and Facing Islands, with the closest Project impact area located more than 2km southwest of the boundary (i.e. the areas to be dredged, near the southern end of Facing Island)	• Coral reefs	
	• Fish and other nekton	
	• Marine turtles	
	• Other marine reptiles	
	• Megafauna	
Nuclear actions (including uranium mining) (Sections 21 and 22A)		
Not relevant to the Project	N/A	N/A
A water resource, in relation to coal seam gas development and large coal mining development (Sections 24D and 24E)		
Not relevant to the Project	N/A	N/A



Appendix D – MSQ First Strike Oil Spill Response Plan

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Port of Gladstone

First-strike Oil Spill Response Plan

A supplement to the Queensland Coastal Contingency Action Plan

Document control sheet

Prepared by	Maritime Services Branch
Division	Maritime Safety Queensland
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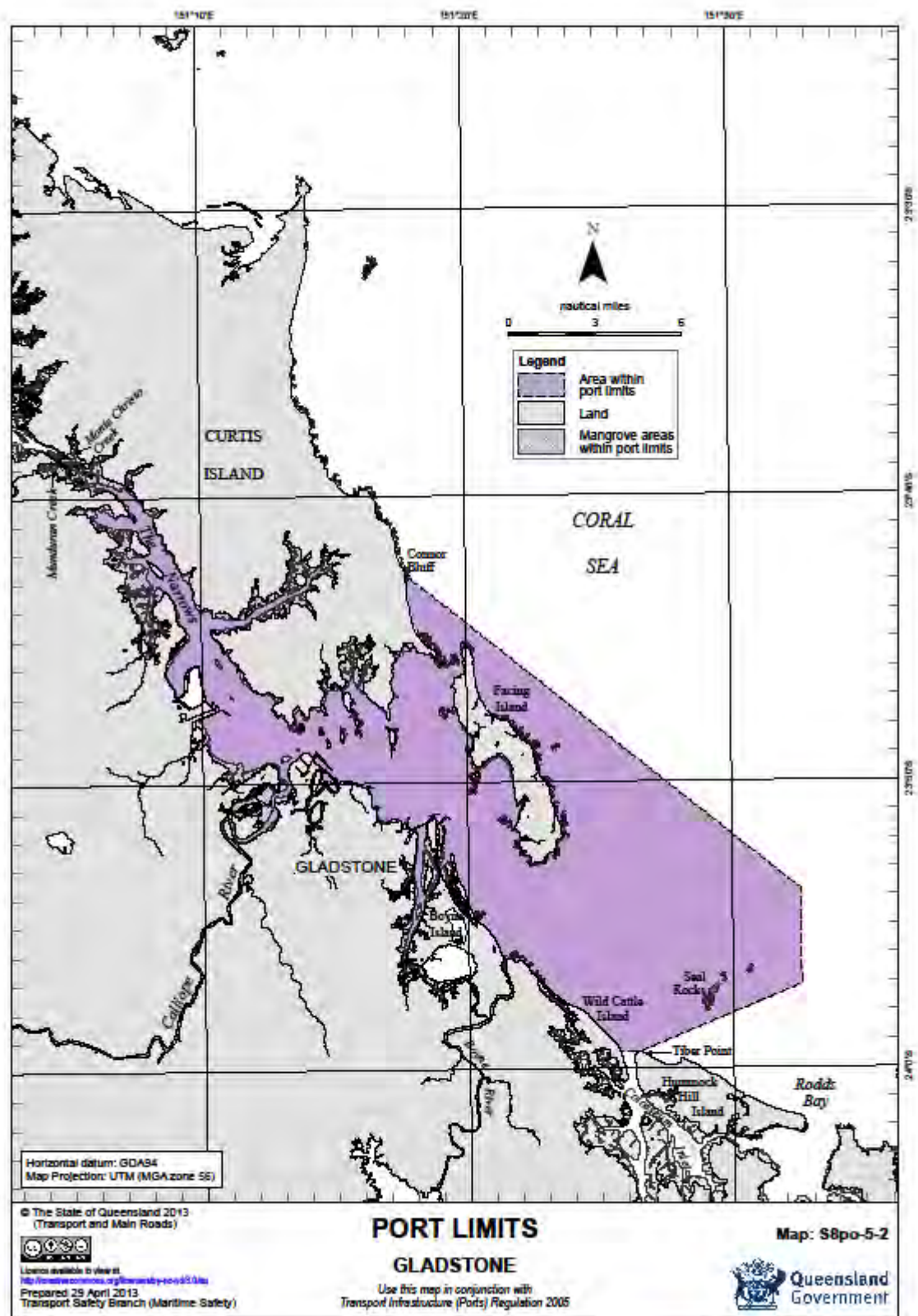
Version 1 of this document was approved by the Chair of the Queensland National Plan State Committee in July 2006. Subsequent amendments have been of an administrative nature only and have not changed the intent of the document.

Contact for enquiries and proposed changes

If you have any questions or suggested improvements please phone the Manager, Pollution Response on 3066 3911 or email pollution@msq.qld.gov.au

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1 Introduction

This plan has been prepared by the Department of Transport and Main Roads in accordance with the agreed arrangements of Australia's National Plan for Maritime Environmental Emergencies (National Plan) and the requirements of the Transport Operations (Marine Pollution) Act 1995. It is a supplement to the Queensland Coastal Contingency Action Plan.

2 Scope

This plan deals with first-strike response to oil spills from ships and other sources within the port of Gladstone, Queensland. See Appendix A for details of geographical area.

3 Objective

The aim of this plan is to describe the operational arrangements of the Oil Pollution First-Strike Response Deed between Maritime Safety Queensland and the Central Queensland Ports Authority (formerly Gladstone Port Authority). In doing so the plan describes the first-strike response and handover arrangements for oil spills within the port, identifies available resources, and provides key contact information.

The plan is not a stand alone document and should be read in conjunction with:

- the Queensland Coastal Contingency Action Plan (QCCAP)
- Maritime Safety Queensland Standard Operating Procedures for oil spill response
- the Oil Pollution First-Strike Response Deed for the port of Gladstone.

4 Roles and Responsibilities

The roles and responsibilities for first-strike response to oil spills within the port limits of Gladstone are defined as follows:

- Maritime Safety Queensland is both Statutory and Combat Agency for response to all ship sourced oil spills.
- Gladstone Ports Corporation is responsible for first strike response, as per the Oil Pollution First-Strike Deed and this contingency plan, to all oil spills within the port limits.
- The Department of Environment and Heritage Protection (DEHP) is the Statutory Agency for land sourced oil spills and is responsible for assuming the role of Environment and Science Coordinator (ESC) for oil and chemical spills in:
 - harbours and working areas of the port outside of the Great Barrier Reef Marine Park, and
 - coastal waters outside the Great Barrier Reef World Heritage Area.
- This role will be exercised in full consultation and cooperation with the GBRMPA.

- The GBRMPA is responsible for assuming the role of ESC where oil or chemical spills occur within the Great Barrier Reef World Heritage Area and adjacent shorelines, excluding those harbours and working areas of the Port which fall outside of the Great Barrier Reef Marine Park. This role will be exercised in full consultation and cooperation with the DEHP.
- Maritime Safety Queensland will provide first strike capability support for land sourced oil spills, aside from spills from oil terminals, through a memorandum of understanding with DEHP which is the statutory and Combat Agency.
- The relevant oil company or terminal operator is the designated Combat Agency for first-strike response to oil spills from oil terminals. The cooperative arrangements for response to oil spills by the Australian oil and associated industries are described under the oil industry's AMOS Plan.
- Gladstone Regional Council is responsible for shoreline cleanup operations outside of the port security area under the direction of Maritime Safety Queensland.

Details of the roles and responsibilities may be found in Schedule 1 to the Inter-Governmental Agreement on Australia's National Plan for Maritime Environmental Emergencies.

5 Direction of Maritime Safety Queensland

Maritime Safety Queensland directs the Gladstone Ports Corporation to initiate and carry out first-strike response operations within the port of Gladstone in accordance with Section 8 of this plan.

6 Threat Assessment

In 2010, Maritime Safety Queensland commissioned a semi-qualitative risk analysis of oil spills from ships over 10 metres in length for all ports in Queensland. The results of the study show there is a risk of an oil spill occurring within the port of Gladstone, with the main risk factors being land-based spills, the frequency of small spills, refuelling activities and navigational hazards within the port. The port also has a high sensitivity rating.

The port of Gladstone contains a number of diverse environments, some of which are highly sensitive to the effects of marine pollution. These include large areas of mangroves, intertidal flats and seagrass beds close to the shipping channel and port area. Other areas, particularly The Narrows, are extremely sensitive to the environmental effects of oil spills. Similarly the Gladstone marina, Auckland Creek and Barney Point beach, as well as the islands within the harbour, are important recreational areas for the local community.

While the risk of a significant oil spill in the port is small, a number of activities that regularly occur in the port do present a credible threat. These activities include:

- large trading ships entering and leaving the port via a narrow channel
- oil product tankers discharging oil products at South Trees and Auckland Point Berths
- Chemical tankers discharging Caustic Soda at South Trees Wharf, Fisherman's Landing #2 Berth and Bulk Liquid Ammonia at Fisherman's Landing #5 Berth
- Large trading ships calling to load bunkers

- Large trading ships bunkering whilst undertaking cargo operations
- large trading ships coming in contact with berths or other ships
- significant commercial shipping activity and refuelling operations in the Marina
- commercial and recreational shipping activity in Auckland Creek and the adjacent marina
- commercial and recreational shipping activity in the Boyne River.

7 Possible Spill Scenarios

The most common type of oil spills likely to occur in the port are small spills of petrol, diesel fuel or bilge oil from commercial or recreational ships or shore based activities. However it is also possible that the following types of spills may occur within the port.

- 300 tonnes of heavy fuel oil from trading ships resulting from serious contact incidents
- 10 tonnes of petroleum products, including heavy fuel oil, during cargo transfer operations at anchorages and berths during bunkering operations
- 5 tonnes of petroleum products, including heavy fuel oil, during bunkering operations associated with the bunker barge *Larcom*.

While each of the scenarios listed above could escalate beyond what is generally termed 'first-strike response', prompt and effective action will help limit the effects of a spill.

8 Response Options

The following guidelines apply to first-strike response within the port.

Area	Monitor	Contain Recover	Protect Resources	Shoreline Cleanup	Apply Dispersant
Gladstone Marina	Yes	Yes	If viable	If viable	No
Auckland Creek	Yes	If viable	If viable	If viable	No
Fisherman's Landing	Yes	If viable	If viable	If viable	If viable
Clinton Wharves	Yes	If viable	If viable	If viable	If viable
Auckland Point Wharves	Yes	If viable	If viable	If viable	If viable
Barney Point Wharf	Yes	If viable	If viable	If viable	If viable
South Trees Wharf	Yes	If viable	If viable	If viable	If viable
Boyne Wharf	Yes	If viable	If viable	If viable	If viable
Areas seaward of Facing Island	Yes	If viable	If viable	If viable	If viable
Boyne River	Yes	If viable	If viable	If viable	No

Note : Any decision to use dispersants within the port area should be made in accordance with the dispersant use policy and guidelines outlined in the Queensland Coastal Contingency Action Plan. Under the guidelines:

- Prescribed Officers from GBRMPA, AMSA and Maritime Safety Queensland may authorise the use of dispersants within areas of the port that lie within the Marine Park
- Prescribed Officers from AMSA and Maritime Safety Queensland, in consultation with EPA, may authorise the use of dispersants in port areas that are outside the Marine Park.

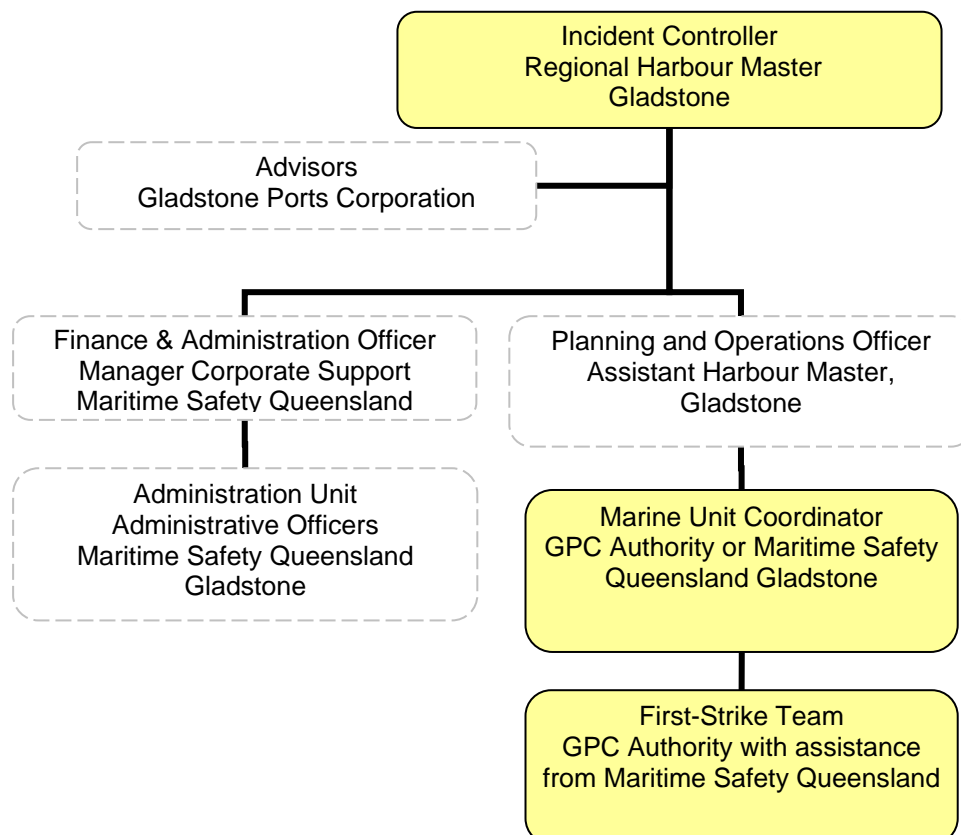
9 Response and Handover Arrangements

Early first-strike response action should include an assessment of the time and resources required to effectively manage each incident. Where a response is likely to be prolonged or exceed the port's first-strike response capacity, GPC should request assistance from Maritime Safety Queensland. When determining the need for assistance and hand-over of the response, GPC should consider the number and availability of local trained response personnel, their ability work safely without the need for excessive work hours, and the capacity of the ports' first-strike response equipment. Requests for assistance should be made as soon as possible and preferably in the first or subsequent SITREPs.

10 Incident Control Centre

The Incident Controller may elect to establish an Incident Control Centre (ICC) to aid in management of an incident within the port. If required, the ICC will be established in the office of the Regional Harbour Master (Gladstone).

11 Response Team Structure



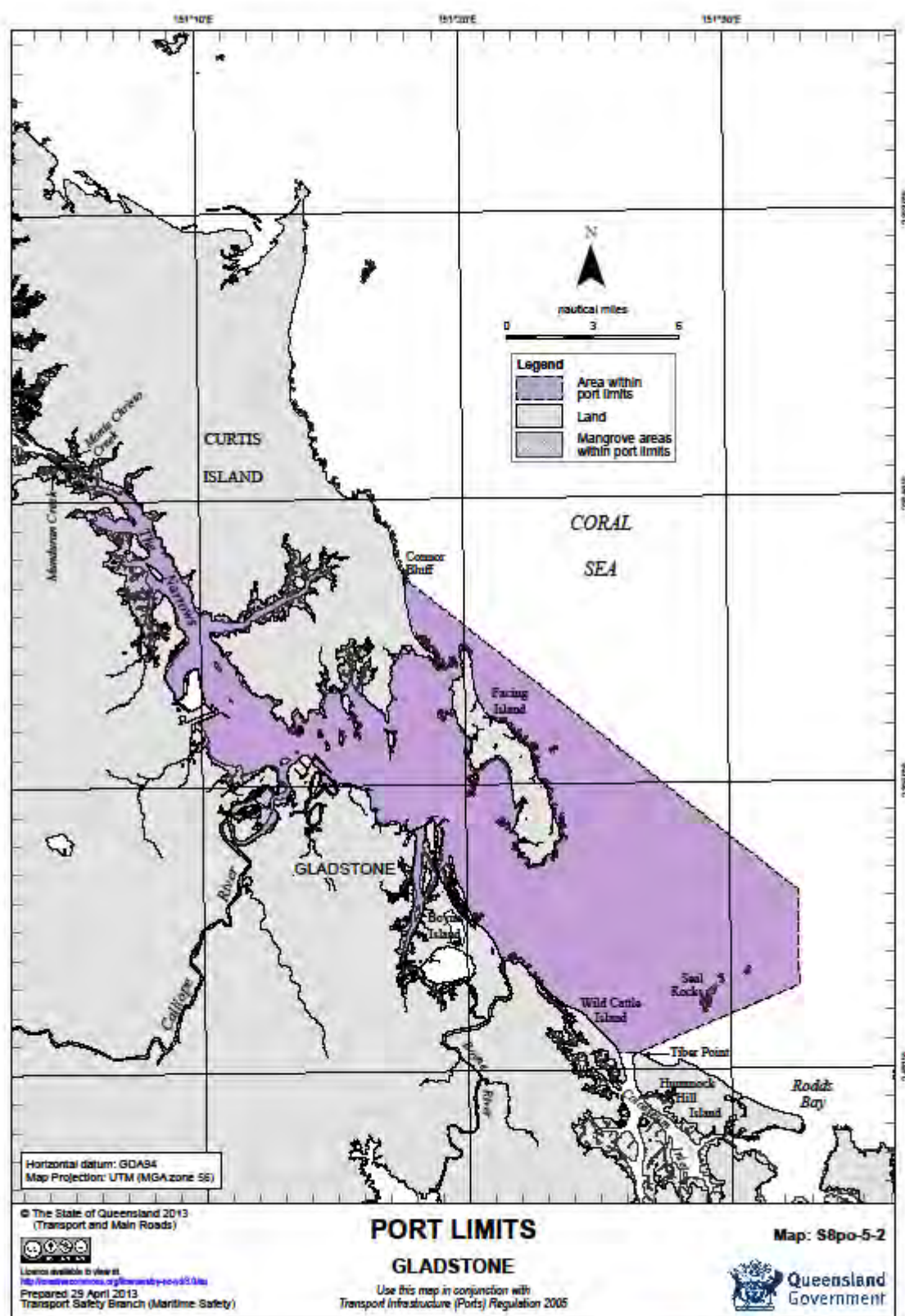
12 First-Strike Equipment

Equipment	Maritime Safety Queensland Marine Operations Base Alf O'Rourke Drive, Gladstone
Boom (Structurflex GP)	300 metres
Boom (Structurflex Land/Sea)	60 metres
Skimmer (Foilex weir and Spate pump)	1
Container (10m ³ Flexidam)	2
Anchor Kit	1
Sorbent Boom	120 metres
Sorbent Pads	500 pads
Sorbent Mops	150 mops

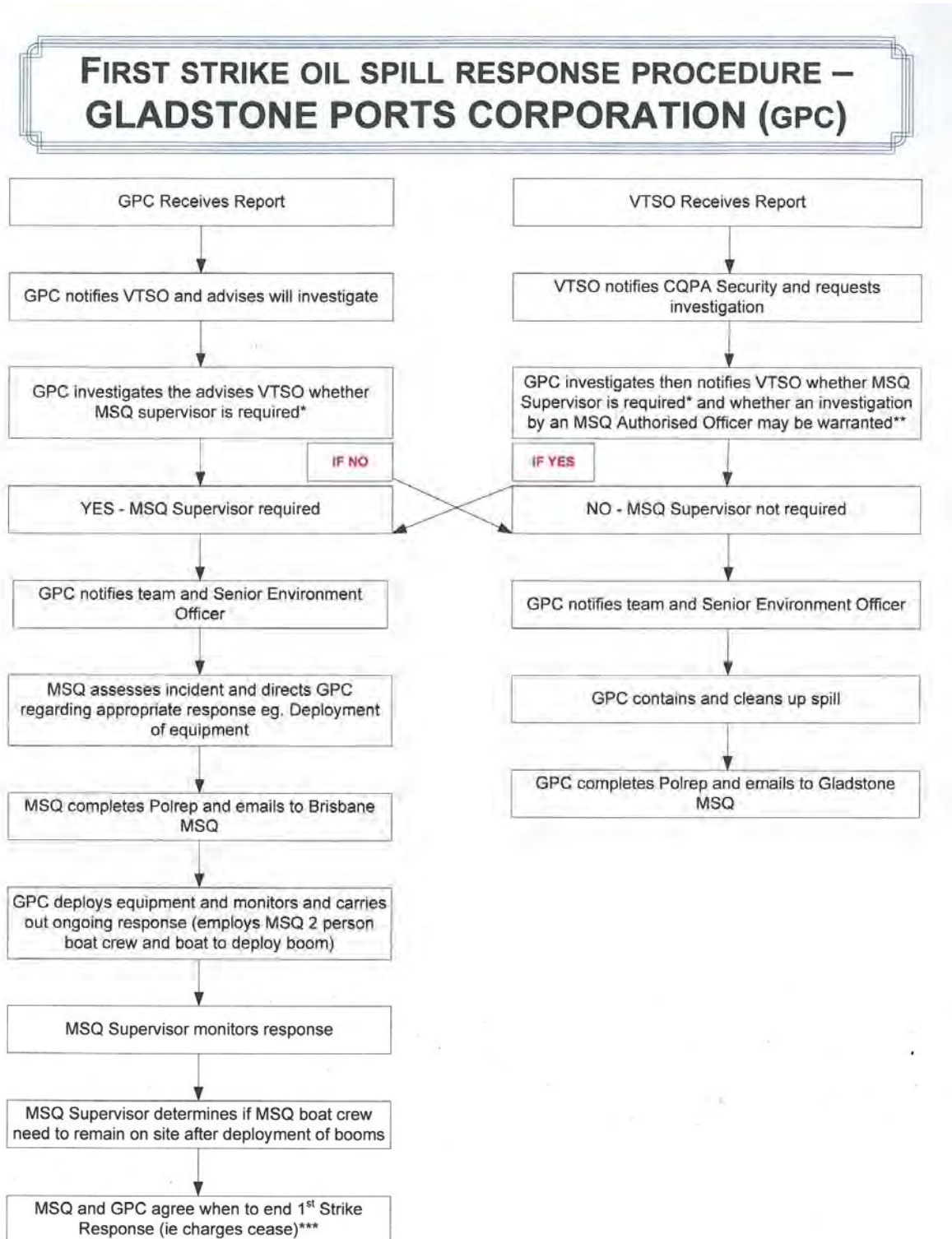
13 Contact List

Role	Position	Phone	Mobile
Gladstone Port Control	Duty VTS Officer	4973 1208	24 hours
MSQ Incident Controller	Regional Harbour Master, Gladstone	4971 5200	0407 878 852
Planning & Operations Officer	Assistant Harbour Master (Gladstone)	4971 5200	0459 827 398
Finance & Administration Officer	Manager Corporate Support, MSQ Gladstone	4971 5276	0409 340 365
Marine Unit Coordinator	Gladstone Ports Corporation	4976 1333	24 hours
Environment and Science Coordinator for spills that are unlikely to impact the GBRMP	DEHP	1300 130 372 Extension 2 24 hours 0427 401 931 0408 758 802	1300 130 372 Extension 2 24 hours
Environment and Science Coordinator for spills that are likely to impact the GBRMP	GBRMPA	4750 0700	3830 4919 quote 'oil spill' 24 hours
Shoreline Cleanup Coordinator	Gladstone Regional Council, (Health Leading Hand)	0407 379906 or 4970 0700	After hours Emergency 4979 1134

Appendix A – Map of Gladstone Port Limits



Appendix B – GPC Oil Spill Response Procedure





Appendix E – Summary of potential impacts and relevant management plans to be implemented to minimise impacts

Direct/ indirect impact	Potential impact	Management plans							
		ASSMP	PWMP	VMP	FMP	WQMP	NVMP	AQMP	WMP
Dredging activities (Dredging EMP)									
Direct	Direct loss of potential deep water seagrass habitat through dredging activities (i.e. initial dredging for the barge access channel and dredging for duplication of the existing channels)			✓					
	Loss of potential seagrass habitat in the areas to be dredged			✓					
	Permanent loss of reef habitat					✓			
	Generation of underwater noise from dredging plant leading to injury or impacting behaviour of fish and other marine reptiles				✓		✓		
	Direct loss of soft sediment habitat through dredging of 12.85Mm ³ of seafloor					✓			
	Displacement and alteration of benthic macroinvertebrate communities within dredging footprint			✓		✓			
	Disturbance due to increased noise, dust and/or vibration impacting on migratory shorebird and/or migratory seabird roosting and foraging				✓		✓	✓	
	Mortality and injury of migratory shorebirds and/or migratory seabirds as a result of vessel movements				✓				
	Injury or death of fauna due to interaction with the dredgers, work boats and land based vehicles within the WBE reclamation area during dredging, transfer and placement of dredged material				✓				
	Placement of dredged material resulting in the injury or death of fauna entrapped in the WBE reclamation area following bund wall closure				✓				
	Decline in water quality in marine areas through dredging activities disrupting behaviour				✓	✓			
	Decline in water quality through impacts of decant water and PASS	✓				✓			
	Injury and/or death as a result of ingestion or entanglement of waste materials and marine debris				✓				✓
	Indirect	Reduced water quality causing impacts to coastal and deep water seagrass meadows through increased turbidity in water column and reduced benthic light availability and smothering of seagrass meadows through increased rates of sedimentation					✓		
Short term decline in water quality resulting in impacts on reef habitat		✓				✓			
Hydrological and water quality impacts resulting in alteration of reef habitat		✓				✓			✓
Decline in water quality in marine areas through dredging activities disrupting behaviour of fish and other marine fauna					✓	✓			
Direct loss of habitat and food source as a result of seabed removal at areas to be dredged leading to displacement and modification of marine fauna communities				✓	✓				



Direct/ indirect impact	Potential impact	Management plans							
		ASSMP	PWMP	VMP	FMP	WQMP	NVMP	AQMP	WMP
	Declining water quality through turbid plumes and sedimentation leading to impacts to seagrass meadows and other habitat	✓		✓	✓	✓			
	Declining water quality impairing fish and other marine species ability to detect predators/prey and to respond to specific environmental cues	✓		✓	✓	✓			
	Turbidly plumes resulting in a decrease of pelagic and planktivorous fish species within impacted areas	✓			✓	✓			
	Disturbance of soft sediment habitats and benthic macroinvertebrate assemblages due to vessel movements			✓					
	Direct loss of benthic communities which provide a food source for intertidal fauna assemblages within Port Curtis			✓		✓			
	Light spill from dredging vessels resulting in phototaxis responses in fish, their larvae and food sources				✓				
	Injury and/or death of fish and other marine fauna as a result of ingestion or entanglement of waste materials and marine debris				✓				✓
	Potential release of contaminants from dredging plant (e.g. spills, waste materials) into habitat areas and subsequent bioaccumulation in higher trophic species (e.g. sharks and rays)	✓			✓	✓			✓
	Suspension of material may occur at both the dredger head and at the dewatering discharge points	✓		✓					
	Impacts on migratory shorebirds, migratory seabirds and/or important habitat due to contaminant releases and changes in water quality	✓		✓	✓	✓			✓
	Loss of migratory shorebird and migratory seabird food sources			✓	✓				
	Displacement of fauna as a result of increased noise, vibration and artificial lighting during dredging activities and associated impacts on fauna movement and dispersal				✓		✓		
	Light spill from marine construction plant disrupting navigation				✓				
	Displacement of macroinvertebrates due to the introduction and spread of invasive marine species		✓						

Table notes:

ASSMP Acid Sulfate Soils Management Plan
VMP Vegetation Management Plan
WQMP Water Quality Management Plan
AQMP Air Quality Management Plan

PWMP Pest and Weed Management Plan
FMP Fauna Management Plan
NVMP Noise and Vibration Management Plan
WMP Waste Management Plan